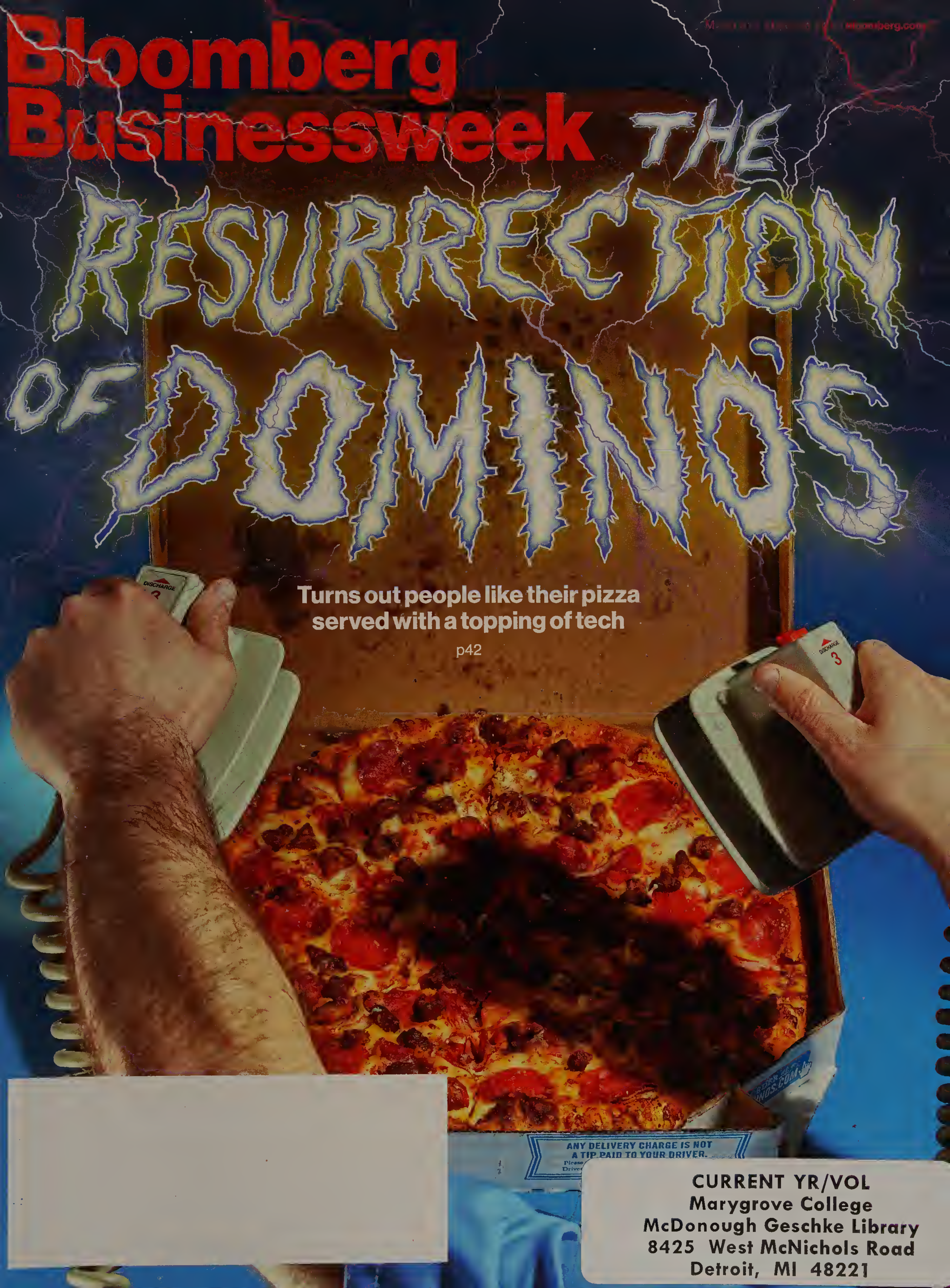
Bloomberg Businessweek

THE RESURRECTION OF DOMINO'S

Turns out people like their pizza served with a topping of tech

p42



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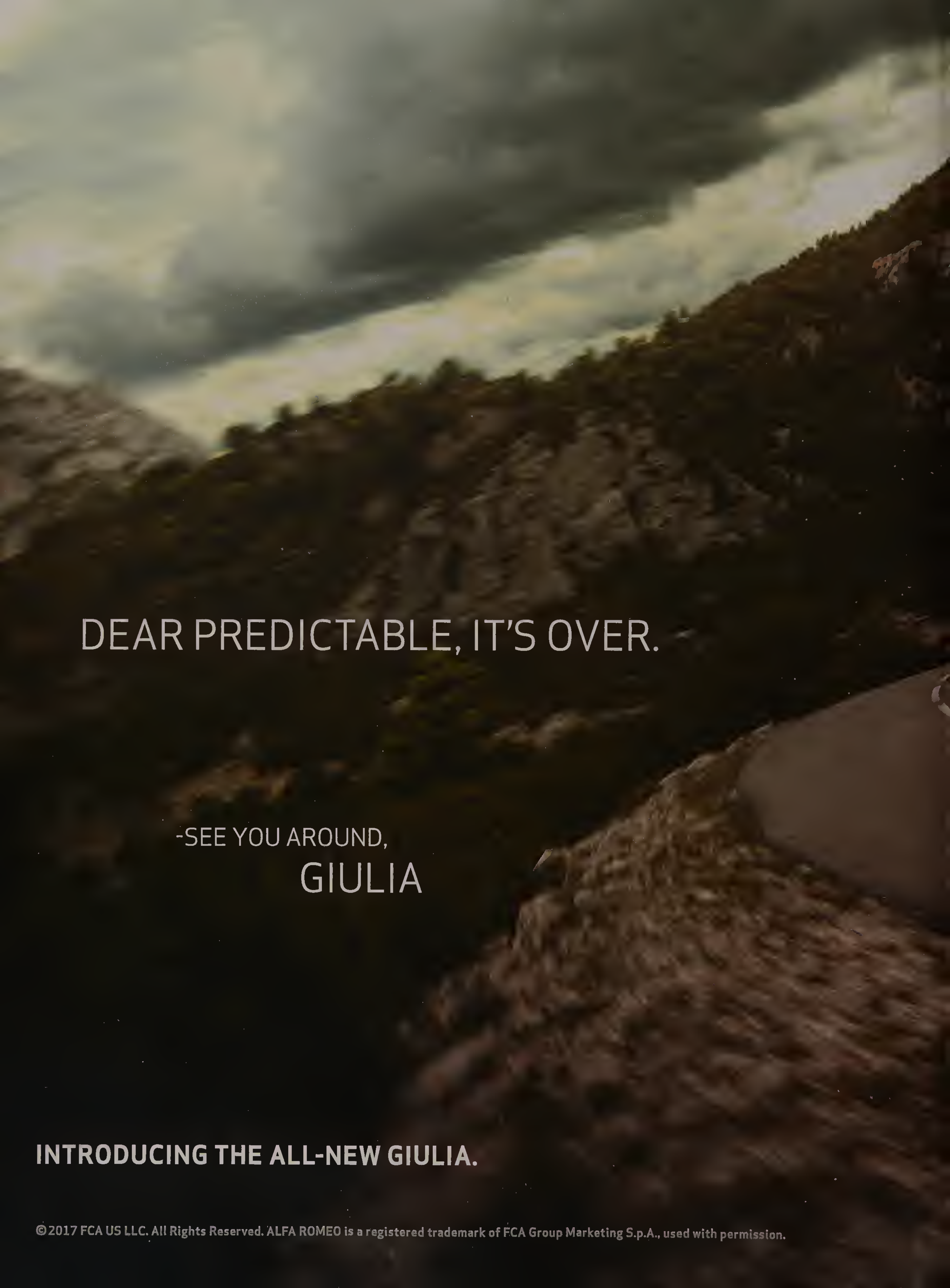
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Bloomberg Businessweek
March 20 — March 26, 2017

Cover Trail

How the cover gets made

Domestic

❶

"The cover's on Domino's. We go into how it got to be the leader in the pizza business."

"I'm going to go ahead and proclaim this to be the most important business story of the year. As a research assignment, I'm going to order the art department 20 pizzas—in order to understand the thesis of the story firsthand."

"Maybe you should photograph one of the pizzas?"

"I like the way you think."

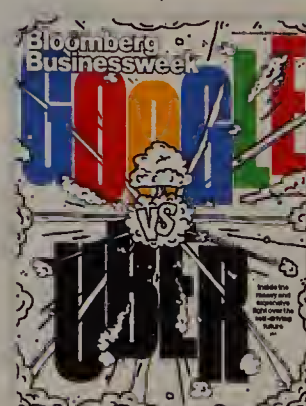
International

❶

"Story's about the legal battle between Google and Uber over self-driving technology."

"Will this self-driving technology increase the speed of pizza deliveries?"

"It's time to move on."



DOMESTIC COVER AND COVER TRAIL: PHOTOGRAPH BY DAVID BRANDON GEETING FOR BLOOMBERG BUSINESSWEEK; PROP STYLIST: PRISCILLA JEONG; INTERNATIONAL COVER: ILLUSTRATION BY 731

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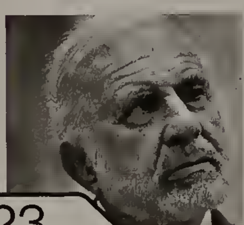

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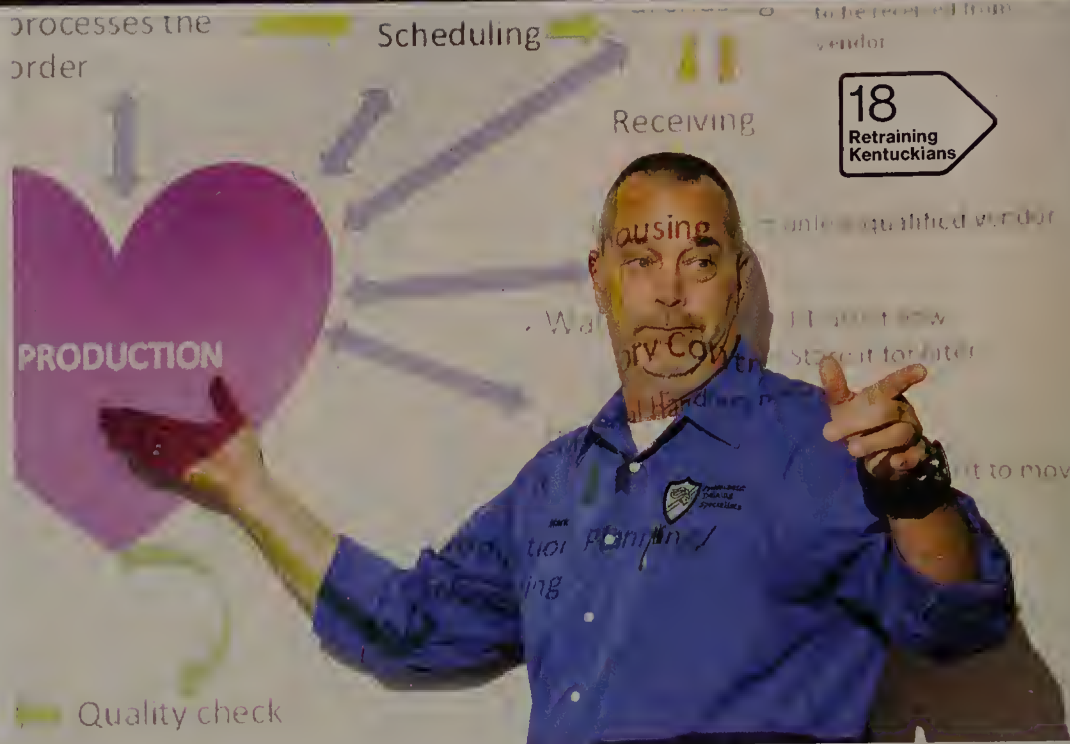

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The South Korean Mirage

By Michael Schuman

In spite of prosperity, Seoul's latest scandals prove that the country has yet to shake off its bad old habits

Soon after I arrived in Seoul in 1996 as a young correspondent, a colleague brought me to a tiny restaurant buried deep in a warren of alleyways in the capital's center—the kind of place only a local could find. Tucked into a traditional Korean house was a restaurant where customers on wooden stools and floor mats were huddled over steaming crocks of *soojaebi*, a hearty soup with thick, hand-torn noodles. Even back then, the eatery was a glimpse into a fast-fading past in a city relentlessly on the move, and it quickly became one of my favorites.

More than two decades have passed, and large swaths of Seoul are wealthier and practically unrecognizable, including sections around those alleyways, now unfortunately refurbished into a Disneyfied version of what old Korean streets might look like. But that restaurant has somehow survived, as difficult to locate as ever, with the same wooden stools and pots of soojaebi. South Korea is like that: The more things change, the more they just don't.

Sadly, that's true in ways a lot less satisfying than a bowl of soojaebi. The scandals roiling Seoul these days are a throwback to the country's dark and corrupt past. On March 10, President Park Geun-hye was officially ousted from office by the Constitutional Court, following a December vote by the legislature to impeach her. She's accused of conspiring with a close confidant to extort tens of millions of dollars from Korean businessmen. The day before, another court began hearings in the trial of Lee Jae-yong, the leading scion of the family behind the Samsung Group conglomerate, the country's most important. Lee has been indicted for bribery and other charges over his alleged participation in the plot. He's denied wrongdoing.

The traumas reveal just how much the nation of 50 million still needs to reform to prepare itself for a challenging future. On the one hand, few societies anywhere have witnessed as dramatic a transformation over the past half-century—from a war-ravaged, impoverished, agrarian dictatorship to a rich, hyperconnected, raucously democratic member of the Group of 20. Both Park and Lee were meant to be part of that continued modernization. Park, the country's first female president, was supposed to lead Korean women toward the greater participation in politics and business the aging society badly needs. Lee was to herald a new era at Samsung by updating its archaic corporate culture. Instead, both got embroiled in an old-fashioned corruption scandal that's an outgrowth of the government-business complex introduced in the 1960s by Park's father, who ruled as autocrat in Seoul for 18 years.

The scandal leaves South Korea leaderless and adrift at a critical moment—when the region's ultimate anachronism, North Korea, is once again spewing fury. There, too, the leader, Kim Jong-un, was expected to drag the Stalinist monarchy into the 21st century. But this Kim has proved no more enlightened than his father or grandfather who reigned before him. Recent ballistic missile tests and the February spy-novel assassination of Kim's half-brother in Malaysia have refocused security experts worldwide on just how destabilizing North Korea continues to be. Although concerns are rising that Pyongyang may be developing the ability to strike the U.S., it's Seoul, only a short distance from the border, that remains squarely on the front line. A policy review on options for North Korea undertaken by a worried White House even has military action on the table.

You'd think that this drama would spur change on both sides of the Demilitarized Zone. But don't bet your kimchi on it. Sure, South Koreans are ready and waiting for reform. Hundreds of thousands of protesters marched to demand that Park step down, while anger toward the country's big business groups, the chaebol, runs high. But Seoul has repeatedly suffered such political upheavals only to stumble into yet another. In 1996, two former South Korean presidents were found guilty of corruption, while one chaebol chief after another has been paraded into court for bribery, embezzlement, and worse. As the Park scandal shows, the corrupt collusion between the state and the chaebol remains all too central to South Korean politics.

The reasons for that are complicated. In a society where personal relationships form the basis of business and politics, old patterns of behavior have proved surprisingly resistant to change. Then there's the fact that the chaebol play an indispensable role in the national economy. The revenues of the five largest were equivalent to 58 percent of gross domestic product in 2015, up from 37 percent in 2008. That's rendered politicians wary of

destabilizing the business groups—and explains why president after president pardons convicted tycoons. Lee's father was indicted on a charge of tax evasion and resigned as Samsung chairman in 2008, only to reclaim a management post two years later after receiving a presidential pardon. We can't assume Lee won't follow in his dad's footsteps.

Up north, the regime in Pyongyang has defied predictions of its impending demise since the fall of the Berlin Wall. The Kims have outlasted famines, ever-tightening sanctions, and almost total economic isolation. Attempts since the Clinton years to persuade Pyongyang to give up its nuclear weapons program have failed. Say what you will about those Kims, they sure know how to sweep aside the dustbin of history.

The sole road to change in North Korea runs through China. While the rest of the region has frozen out Pyongyang, Beijing's leaders have stood by their communist comrades, providing North Korea with its only substantial economic lifeline. The Chinese have resisted perennial calls from Washington to bring their partner to heel. Beijing has been only too happy to let the Kims rankle America's close allies, Japan and South Korea.

Now, though, indications are that China's attitude toward North Korea may be changing. The threat posed by Pyongyang is, like a boomerang, spinning back on China. Beijing is apoplectic over Seoul's deployment of an American missile defense system. Although it's meant to protect the country from an erratic Kim, the Chinese see it as a challenge to their own national security. Beijing has been critical of Kim's recent missile tests, and in February the Chinese government suspended coal imports from North Korea—a big blow to its feeble economy. On March 8, China's foreign minister, Wang Yi, even suggested Pyongyang suspend its nuclear and missile activities in exchange for a halt to joint military exercises by the U.S. and South Korea. Both sides, he said, should sit and talk. If these steps signal a true change of China's stance on North Korea, Beijing might be more willing to prod Pyongyang into better behavior, or possibly negotiations with Washington.

Fresh winds may be blowing in Seoul, too. The front-runner to replace Park as president, the Democratic Party's Moon Jae-in, is from the liberal end of South Korean politics, and he advocates a softer approach to North Korea and a harder one toward the chaebol. The former civil rights activist has pledged to make chaebol reform a top priority. He also favors measures that would strengthen corporate governance and weaken the hold that families such as the Lees have over the chaebol and the economy overall.

Meanwhile, Pyongyang's saber rattling is raising concerns, even for its ally China

How events unfold will reverberate far beyond the Korean Peninsula. Some settlement with Pyongyang would defuse one of the world's most dangerous security threats and possibly reshape the geopolitics of East Asia. A concerted program to reform South Korea's business groups could make its economy stronger and better able to contend with the challenge of a rising China rapidly gaining in wealth and technology. But all this remains in the realm of "ifs." Change has been thwarted, and opportunities missed, many times before. So manage your expectations, and pass the soojaebi. ❸

To read Noah Feldman on why Preet Bharara should have resigned and Mohamed El-Erian on the markets' shift, go to
Bloombergview.com

Health Care Needs the Individual Mandate

Substituting tax incentives for insurance requirements won't protect Americans

To understand why the Republicans' alternative to Obamacare won't be an improvement, it may be helpful to step back and ask about the purpose of this or any other health-care plan. America has already decided as a society that people shouldn't be allowed to die in the street for lack of health care. Donald Trump himself has said so, and federal law requires that almost all emergency rooms treat all patients regardless of their ability to pay.

When patients lack the resources to pay a bill, or the insurance to cover it, their fellow citizens pick it up through federal or state and local income taxes. Whether they like it or not, Americans already bear the responsibility for this expense.

Under Obamacare, the collective responsibility is managed through insurance rather than taxes: All Americans are required to have health insurance or pay a penalty—the so-called individual mandate. The cost is still shared, but via insurance, which is systematically tailored to fund medical expenses. You pay into the insurance pool but draw from it only when you find yourself in need of medical care.

Under the Republicans' American Health Care Act, there would be no such requirement to have health insurance. That won't bring an end to shared medical expenses, however. It only means returning to a system in which many people's health costs are paid with tax dollars.

Republicans have argued that the government shouldn't be able to force people to purchase something they don't want. That may be true for many things people might buy, but health insurance is different, because the costs incurred by people without it will be borne by everyone else. Keep in mind, the U.S. has a history of requiring all citizens to fund many essential services, such as education and security.

Republicans would prefer to encourage people to buy insurance by offering them a modest tax credit and allowing insurers to hike premiums on those who fail to maintain continuous coverage. But those incentives are unlikely to keep as many young and healthy people in the market as the individual mandate does. With an older, less healthy pool, prices will rise. Health insurance works only if the costs are spread widely.

In arguing for their system, Trump and congressional Republicans continue to claim that Obamacare hasn't worked. In truth, while the Affordable Care Act could use a tuneup, it's delivered decent insurance to millions of people and is on course to cover millions more. It seems to have even convinced some Republicans—none of whom voted to pass Obamacare—of the wisdom of greater government involvement in the health-care system. But effective health care requires a mechanism to ensure costs are widely shared. The GOP plan fails to do this. If this is the best they can offer, it would be better to change nothing at all.

Don't Gut the U.S. Weather Service

Trump's plans for the research agency are shortsighted and show his disregard for science

The National Oceanic and Atmospheric Administration is only one of the agencies marked for drastic funding reductions to enable a boost in military spending. But the cuts reveal alarming pitfalls in the president's approach to budgeting: a reluctance to invest in the future, a disregard for science, and a willingness to damage a well-functioning operation for minimal payoff.

According to an outline recently obtained by the *Washington Post*, NOAA's budget is set to lose almost $1 billion, a crippling 17 percent hit. The cuts would be especially deep to divisions that work on climate modeling, so they might seem unsurprising targets for a president who doubts the reality of climate change. But even those who question the human contribution to climate change should recognize the need to carefully monitor climate patterns and carbon levels in the air and oceans. Data that go uncollected today can't be retroactively gathered tomorrow.

NOAA also works on weather models and forecasts, which protect all Americans and many businesses from storms and flooding—a service worth an estimated $100 annually to every household in the country. TV weather reports and forecast apps depend on data collected and processed by NOAA, as do the insurance and aviation industries.

The satellite program needs consistent funding to maintain a well-operating and up-to-date fleet. Jeopardizing the next generation of satellites puts at risk the ability to manage accurate forecasts two decades from now.

Arguing against budget cuts is a time-honored Washington tradition, and almost every department can say that its spending is but a tiny fraction of the Pentagon's $600 billion budget. What makes the proposed cuts at NOAA especially pointless, however, is their shortsightedness. Accurate weather forecasts will remain a daily necessity. And NOAA's role in assessing the existential threat of climate change is vital.

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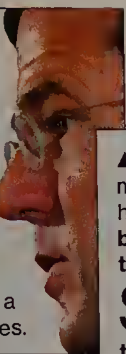
Movers

By Kyle Stock

▲ In this year's NCAA basketball tournament, **Under Armour has its logo on the jerseys of 12 teams**, including underdog Northwestern University—double the number it sponsored in 2015. Nike still leads with 40 schools.

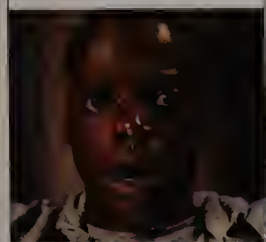


▲ Dutch Prime Minister **Mark Rutte's Liberal Party defeated the anti-Islam Freedom Party of Geert Wilders** in an election seen as an indicator of populist sentiment in Europe. Rutte's party, helped by higher-than-expected voter turnout, must form a coalition with other parties.

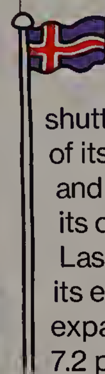
▲ Jordan Peele has made U.S. box-office history as **the first black writer/director to break the**

$100m

threshold with a debut feature, horror movie *Get Out*. Peele made the film for $4.5 million.



▲ **Iceland finally lifted capital controls**, nine years after the credit crisis shuttered three of its banks and swamped its currency. Last year its economy expanded 7.2 percent.



▲The International Beauty Show, celebrating 100 years, welcomed 65,000 attendees to New York's Javits Center. More than 500 vendors showed off their wares, from Manic Panic's hair colors to appliances such as Dyson's $400 blow dryer, which runs on the same technology as its popular vacuum cleaners. **The U.S. beauty market totals $50 billion.**

▲ Medical helicopter company **Air Methods was bought by American Securities**, a private equity company, for

$2.5b

▲ **The Federal Reserve raised its benchmark lending rate a quarter point**, to a range of 0.75 percent to 1 percent, and projects two more increases this year.
More ▷ p17

▲ Raphael Bostic, an economist and housing policy expert, was chosen as president of the Federal Reserve Bank of Atlanta. **He's the first black leader of one of the Fed's 12 regional banks.**

Ups

"They had better be autonomous. Most people can't drive two dimensions, let alone three."

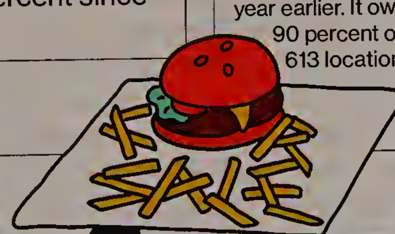
▲ Ford Executive Chairman **Bill Ford weighing in on the prospect of flying cars**.

▲ A financial and investment consulting firm is recommending that **McDonald's franchisees get a new kind of preferred stock** that lets them elect a member of the board, arguing that the restaurant operators represent the bulk of the company's value.

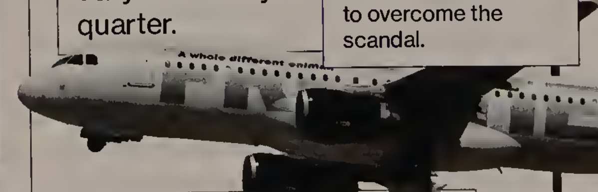
Downs

▼ Bill Ackman's Pershing Square Capital Management sold its entire stake in Valeant Pharmaceuticals International. **The firm lost $4 billion on the investment,** as the shares dropped more than 90 percent since August 2015.

▼ **Ruby Tuesday is putting itself on the block,** as sales in restaurants open more than a year fell 4 percent in the quarter ended on Feb. 28 from a year earlier. It owns 90 percent of its 613 locations.

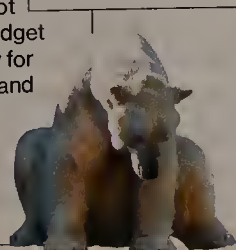


▼ **Frontier Airlines and Silver Airways said they would stop flying from the U.S. to Cuba,** because the market failed to prove as lucrative as expected when it opened last summer. American Airlines has already cut daily service by a quarter.



▼ German prosecutors raided the offices of Volkswagen's Audi unit on March 15, as investigations into **VW's manipulation of emissions tests on its diesel engines continue to weigh on the carmaker.** The raids mark a fresh blow to VW's efforts to overcome the scandal.

▼ **President Trump wants to cut the EPA's budget 31 percent and the State Department and related agencies 29 percent,** according to a blueprint released on March 16. It's not all cuts: The budget "paves the way for eventual over-land commercial supersonic flights"—a billionaire's dream.



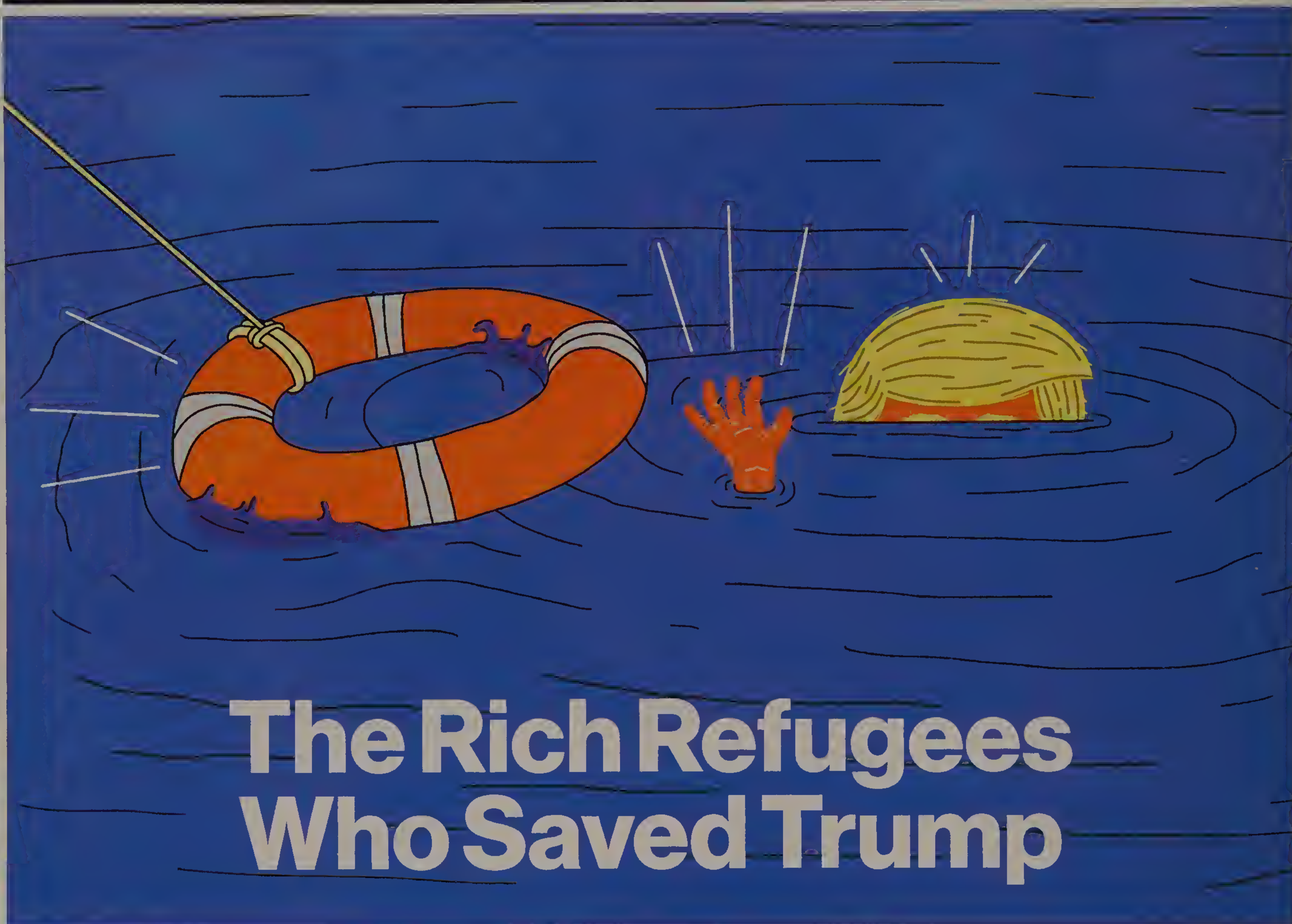
▼ **A German government minister has threatened Facebook, Twitter, and other social media companies with fines of** as much as $53 million unless they do more to block hate speech on their platforms.

24m

▼ **The number of Americans who will go without health insurance by 2026,** according to an estimate by the Congressional Budget Office in evaluating the plan put forth by House Speaker Paul Ryan to replace the Affordable Care Act.

▼ **The U.S. Department of Justice indicted three Russians,** including two intelligence agency employees, and a Canadian for their alleged roles in the 2014 data breach of Yahoo! that affected 500 million accounts.

RUTTE: YVES HERMAN/REUTERS; INTERNATIONAL BEAUTY SHOW: EDUARDO MUNOZ/REUTERS; GET OUT: COURTESY UNIVERSAL PICTURES; POLAR BEAR: PETER STEINER/ALAMY; ILLUSTRATIONS BY OSCAR BOLTON GREEN



The Rich Refugees Who Saved Trump

▶ Down on his luck, the mogul found help from émigrés from the old Soviet empire

▶ "I gave him 30 days, and in exactly 30 days he paid me back"

On the 78th floor: a Russian who once was accused of mob ties and extortion by an oligarch. On the 79th, an Uzbek jeweler investigated for money laundering who was eventually executed on the street in Manhattan. And four floors higher, a pro-Moscow Ukrainian politician whose party hired a Donald Trump adviser.

When Trump World Tower at 845 United Nations Plaza began construction two decades ago as the tallest residential building in the country (90 stories), its most expensive floors attracted wealthy people getting their money out of what had been the Soviet Union. Trump needed the big spenders. He was renegotiating $1.8 billion in junk bonds for his Atlantic City resorts, and the tower was built on a mountain of debt owed to German banks. As Trump wrote in *The Art of the Comeback*, "It crushed my ego, my pride, to go hat in hand to the bankers."

Trump's soft spot for Russia is an ongoing mystery, and the large number of condominium sales he made to people with ties to former Soviet republics may offer clues. "We had big buyers from Russia and Ukraine and Kazakhstan," says Debra Stotts, a sales agent who filled up the tower. The very top floors went unsold for years, but a third of units sold on floors 76 through 83 by 2004 involved people or limited liability companies connected to Russia and neighboring states, a Bloomberg investigation shows. The reporting involved more than two dozen interviews and a review of hundreds of public records filed in New York.

The 1990s were a sobering period for Trump, and it's noteworthy that among those who helped him exit the decade are people to whom he's shown deep loyalty. Presidential counselor Kellyanne Conway and Michael Cohen, his personal lawyer, bought units. Cohen got his Ukrainian in-laws to buy, too. Most of the units were bought before the tower was built, and prices weren't disclosed. Trump World Tower ended up as a model for future developments—with money drawn from sales in Moscow.

Two months before Trump broke ground in October 1998, Russia

EU's demands on the U.K. prove breaking up is hard to do 16

Here comes the Fed rate hike 17

defaulted on $40 billion in domestic debt, the ruble plummeted, and some of the biggest banks started to collapse. Millionaires scrambled to get their money out and into New York. Real estate provides a safe haven for overseas investors. It has few reporting requirements and is a preferred way to move cash of questionable provenance. Amid the turmoil, buyers found a dearth of available projects. Trump World Tower, opened in 2001, became a prominent depository of Russian money.

Sam Kislin, a Ukrainian immigrant, issued mortgages to buyers of multimillion-dollar apartments in World Tower. It's highly unusual for individuals to issue formal mortgages for U.S. luxury real estate, and the tower loans are the only ones Kislin ever made in New York, public records show.

Almost two decades earlier, Kislin had sold Trump about 200 televisions on credit. "I gave him 30 days, and in exactly 30 days he paid me back," says Kislin, now 82. "He never gave me any trouble." He says the televisions were for the Commodore Hotel, which Trump had bought in 1976 with Hyatt Corp.

Trump purchased the sets from an electronics store that Kislin had opened in New York with Tamir Sapir, an immigrant from Georgia. It was famous among Soviets who would buy VHS players and tape recorders to take back home. Sapir later grew rich trading Russian oil. He invested the proceeds in New York real estate, eventually becoming one of Trump's development partners in Trump SoHo, a frequent focal point in inquiries about Trump's financial ties to Russia and questionable Russian money. Sapir died in 2014.

Kislin became a fundraiser for Rudolph Giuliani's mayoral campaign, bringing in millions for the future Trump surrogate. Investigated by the FBI in the 1990s for allegations including mob ties and laundering money from Russia, Kislin was never charged, and he maintains his innocence.

At Trump World Tower, Kislin provided a mortgage to Vasily Salygin, a future official of the Ukrainian Party of Regions linked to Russian President Vladimir Putin, to buy an 83rd-floor apartment. Salygin's time in office overlapped with Paul Manafort's tenure as an adviser to the party. Manafort later served as Trump's campaign manager before his Russian links led to growing criticism and his resignation.

The push to sell units in Trump World Tower to Russians expanded in 2002, when **Sotheby's International Realty** teamed up with **Kirsanova Realty**, a Russian company. One reception at Moscow's swank Hotel Baltschug Kempinski pitched the tower alongside Trump's West Side condos and his building on Columbus Circle.

Eduard Nektalov, an Uzbekistan-born diamond dealer, purchased a 79th-floor unit directly below Conway's for $1.6 million in July 2003. He was being investigated by federal agents for a money-laundering scheme, which involved smelting gold to make it appear like everyday objects that were then hauled to drug cartels in Colombia. Nektalov sold his unit a month after he bought it for a $500,000 profit. Less than a year later, Nektalov, rumored to have been cooperating with authorities, was gunned down on Manhattan's Sixth Avenue.

Simultaneous with when the tower was going up, developer Gil Dezer and his father, Michael, were building a Trump-backed condo project in Sunny Isles Beach, Fla. "Russians love the Trump brand," he says, adding that Russians and Russian Americans bought some 200 of 2,000 units in Trump buildings he built. They flooded into Trump projects from 2001 to 2007, helping Trump weather the real estate collapse, he says.

"The **Trump Organization** is a global brand and much like every other real estate company has likely had purchasers from people of different backgrounds buy units within their properties," Amanda Miller, vice president for marketing at the organization, said in an email. "The press' continued fascination with creating a narrative that is simply not there is both misleading and fabricated."

Sales agent Stotts helped rent out apartments owned by those who invested in World Tower. Her very first job was filling Cohen's apartment after he moved to 502 Park Ave., another Trump building. Three months after the *New York Post* reported that Cohen and his Ukrainian in-laws had bought units in World Tower, Trump hired him.

In 2008, his oldest son, Donald Jr., said, "We see a lot of money pouring in from Russia." What he was referring to has never been clarified, nor has its significance in explaining Trump's friendly attitude toward Moscow. But part of the answer may lie in the hundreds of millions of dollars that salvaged Trump's apartment buildings at a time of financial vulnerability. —*Caleb Melby and Keri Geiger, with Michael Smith, Alexander Sazonov, and Polly Mosendz*

The bottom line Trump was heavily leveraged when he built World Tower in Manhattan, which Russians flocked to.

Sustainability

India's War Over Water—and Soft Drinks

▶ **Coke and Pepsi find themselves boycotted in Kerala and Tamil Nadu**

▶ **"Shopkeepers are making a politically correct stance"**

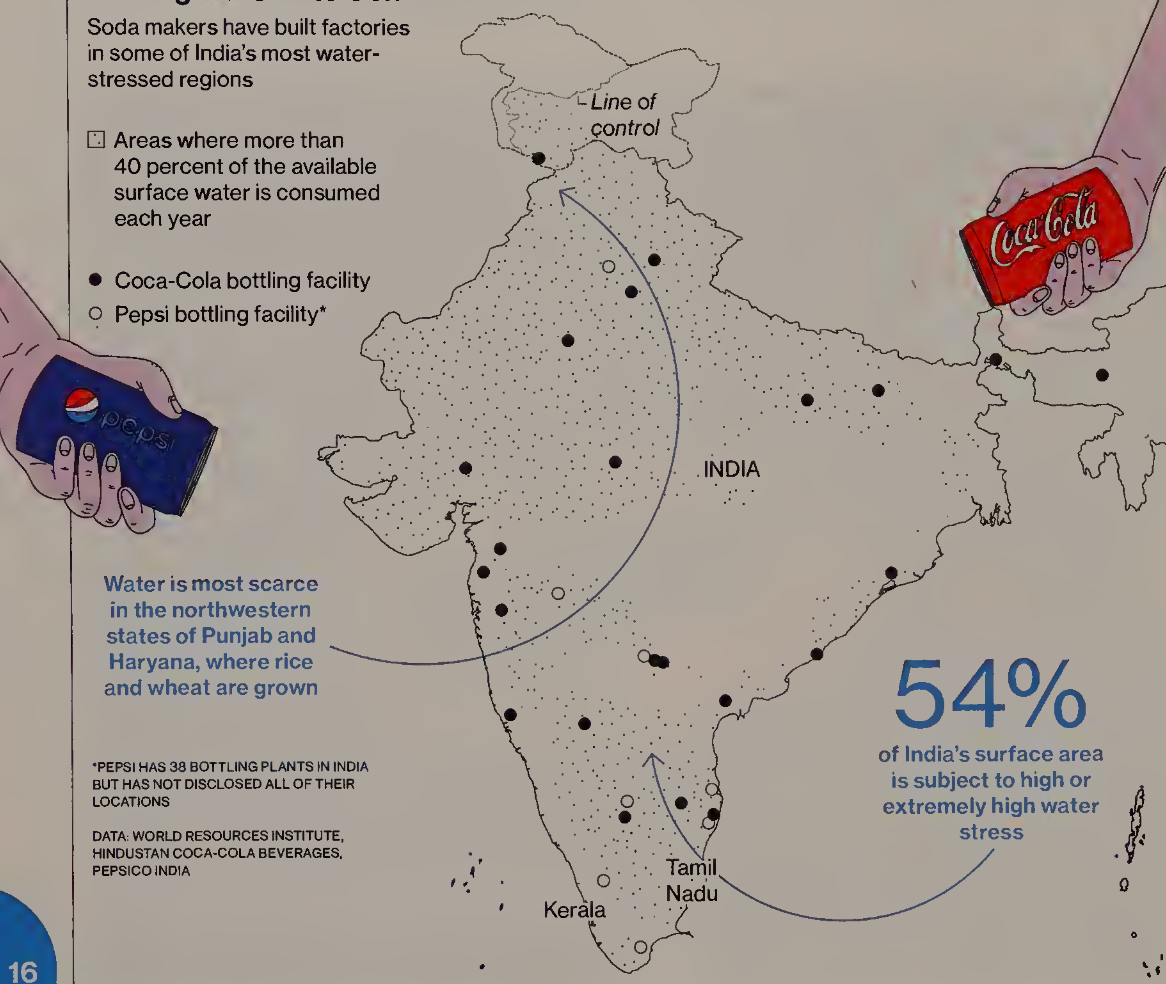
A potent blend of pride, economic nationalism, and mounting concerns over water security has the world's two biggest cola brands in a bind in southern India. On March 15 shopkeepers in drought-hit Kerala state said they will join their counterparts in neighboring Tamil Nadu in boycotting locally made beverages from **Coca-Cola Co.** and **PepsiCo Inc.**

Retail associations blame the companies for siphoning off groundwater and selling products tainted with pesticides. Beyond the rhetoric, academics and analysts say the U.S. soda giants have become caught up in India's complicated battle over diminishing water resources, one that's getting more politically fraught.

India has a chronic water problem, ▶

Turning Water Into Cola

Soda makers have built factories in some of India's most water-stressed regions



*PEPSI HAS 38 BOTTLING PLANTS IN INDIA BUT HAS NOT DISCLOSED ALL OF THEIR LOCATIONS

DATA: WORLD RESOURCES INSTITUTE, HINDUSTAN COCA-COLA BEVERAGES, PEPSICO INDIA

◀ one of the worst in the world, and fights over the resource have erupted between states and users periodically for decades. The failure of monsoon rains to produce expected amounts the past two years–and, in the southern states, three years–has left rivers and reservoirs parched, forcing farmers, manufacturers, and municipal water suppliers to rely more on wells to meet their needs. Those wells are drying up, too, and that's hurting farmers, India's economic mainstay.

"The root cause for the boycott isn't the multinational companies but the enduring fight between industrial users and farmers, especially in several drought-hit states," says P.L. Beena, an associate professor with the Centre for Development Studies in Thiruvananthapuram, Kerala. As U.S. multinationals, Pepsi and Coke are easier to target than Indian companies.

Prime Minister Narendra Modi's call to companies to "make in India" has given rise to a pro-India push. His recent electoral success in several state assemblies makes it likely he'll press the nationalist agenda more aggressively. "With Modi at the center, many activist groups and political parties are taking their agenda to the street more strongly than they have in the past instances," Beena says.

The latest action means soda from Coca-Cola and Pepsi, which together have a 96 percent hold on India's $4.9 billion market, will be kept off the shelves of more than 1 million shops. Vendors would rather lose business than sell the products, says A.M. Vikrama Raja, president of a retailers' association in Tamil Nadu with about 1.5 million members. The boycott began on March 1, the day before the Madras High Court dismissed a petition by a consumer activist to ban the soda makers from drawing water from the local Thamirabarani River. A boycott from farmers could result in Coca-Cola and Pepsi losing "a big part of their consumer base in the rural areas," says Oru Mohiuddin, an analyst for market researcher Euromonitor International in London.

Pepsi, based in Purchase, N.Y., and Atlanta-based Coca-Cola have declined to comment on the allegations of water exploitation and contamination. They are referring questions to the Indian Beverage Association, which said in a March 1 statement that **Hindustan Coca-Cola Beverages Pvt.** and **PepsiCo India** are compliant with all applicable regulations and that their products are safe. That all-clear won't help end the boycott, though. "Shopkeepers are making a politically correct stance by boycotting multinational beverages," says Ramu Manivannan, a political analyst and head of the politics department at University of Madras in the Tamil Nadu capital, Chennai.

India accounts for 18 percent of the world's population, but it possesses only 4 percent of the planet's fresh water. Farms use most of it, leaving industrial users to fight with municipal suppliers over the rest. Some 75 percent of India's surface water (primarily rivers) is contaminated by human and agricultural waste and industrial effluent.

"No noticeable changes to the protection of freshwater sources are yet featuring on the Indian government's agenda," says Jenny Gronwall, program manager for water governance at the Stockholm International Water Institute. "It seems as if the situation must get worse and the general public unite in loud protests before a reduce-reuse-recycle paradigm takes hold."
—P R Sanjai and Archana Chaudhary

The bottom line Pepsi and Coca-Cola sell almost all of India's soft drinks, making them easy targets for protests.

Diplomacy

Theresa May and the EU Square Off Over Brexit

▶ **The British leader will face tough demands in divorce negotiations**

▶ **"Brexit will mean less cooperation and economic integration"**

With a stroke of the queen's pen this month, a new act of Parliament will be signed into law empowering Prime Minister Theresa May to set in motion the formal legal mechanism for exiting the European Union.

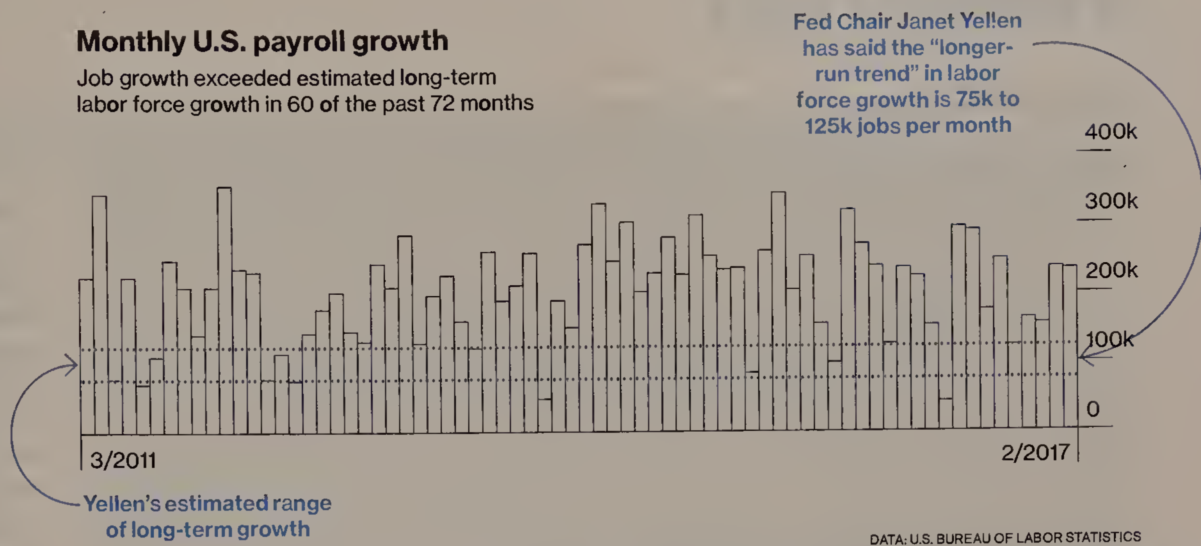
May appears to be in a commanding position. Her main Labour opponents are in disarray, her Conservative Party

Monetary Policy
Why the Fed Hiked

The Federal Reserve raised its target federal funds rate a quarter of a percentage point on March 15, to a range of 0.75 percent to 1 percent. The gain of 235,000 jobs in February sealed the case for the increase. When payrolls grow faster than the labor force, the pool of available workers shrinks, which can lead to higher wages and thus contribute to increased inflation. —*Peter Coy*

Monthly U.S. payroll growth

Job growth exceeded estimated long-term labor force growth in 60 of the past 72 months



DATA: U.S. BUREAU OF LABOR STATISTICS

is as many as 19 percentage points ahead in the opinion polls, and, barring the occasional blip, she's meeting little resistance in her pursuit of a hard, clean Brexit. Her goal remains, she said after leaving an EU meeting in Brussels earlier this month, to build the "independent, self-governing global Britain the British have called for."

May's confident outlook may not last. When she triggers the exit mechanism by invoking Article 50 of the EU Treaty–probably before the end of the month–she starts the clock ticking on a maximum of two years of negotiations on Britain's departure terms and future trade arrangements. The U.K. will be cast out of the EU at the end of the period, even if no deal can be reached. "To end up with no agreement with our EU partners would be a very risky place to be," says Dominic Grieve, former U.K. attorney general.

Yet the longer talks go on without an agreement, the more pressure will build on May to accept any terms that she's offered. That risks "economic chaos," says Charles Grant of the Centre for European Reform. "So if Britain wants a half-decent deal, it needs the goodwill of its partners."

Goodwill is in short supply. Interviews and leaked documents have shown EU leaders from Berlin to Brussels vowing to unite in the talks and ensure the U.K. loses more than it gains from quitting the bloc. Germany said the EU won't splinter or grant too many concessions to the British, while Denmark warned that May's hopes for a new comprehensive free-trade agreement with the EU could take as long as 15 years. Even traditional ally Ireland sided with its EU partners in pushing Britain to pay an exit fee.

A foretaste of what May is up against comes in a memo circulating within the German government and obtained by Bloomberg. It urged EU governments to "not let ourselves be divided," because the "foremost priority" must be to protect the bloc's cohesion. It also stressed that Britain should be made to feel the difference between life inside the bloc and outside it. "Brexit will mean less cooperation and economic integration compared to EU membership," and the U.K. will be treated as a "third country," the document said. "Brexit thus becomes a step backward which will have an effect on Britain."

Even before the talks begin, the British government has squared off against the EU and its chief Brexit negotiator, Michel Barnier, over his suggestion that the U.K. pay as much as €60 billion ($64 billion) to cover what it owes the rest of the EU. The liabilities on Barnier's list are said to include pensions for EU officials, commitments on infrastructure projects, and financial policies such as the Irish bailout. One of May's senior ministers described Barnier's bill as "absurd," while former Chancellor of the Exchequer Nigel Lawson called it a "ransom demand."

Irish Prime Minister Enda Kenny warned that May will need to face up to paying for Britain's previous commitments to the EU. "When you sign on for contracts, you commit yourself to participation, and obviously the extent of that level of money will be determined," Kenny told reporters.

Barnier is insisting May agree to pay before he'll even discuss whether to give her a free-trade agreement with the EU's single market. Germany has sided with Barnier in saying the divorce should be arranged before a new trading relationship is discussed.

Britain would prefer to hold the talks in parallel. May said at the meeting in Brussels that she's still aiming for a "good and comprehensive" accord and working toward the two-year deadline. She hinted, though, that she wasn't necessarily talking about the trade deal being fully concluded by then, only its "framework."

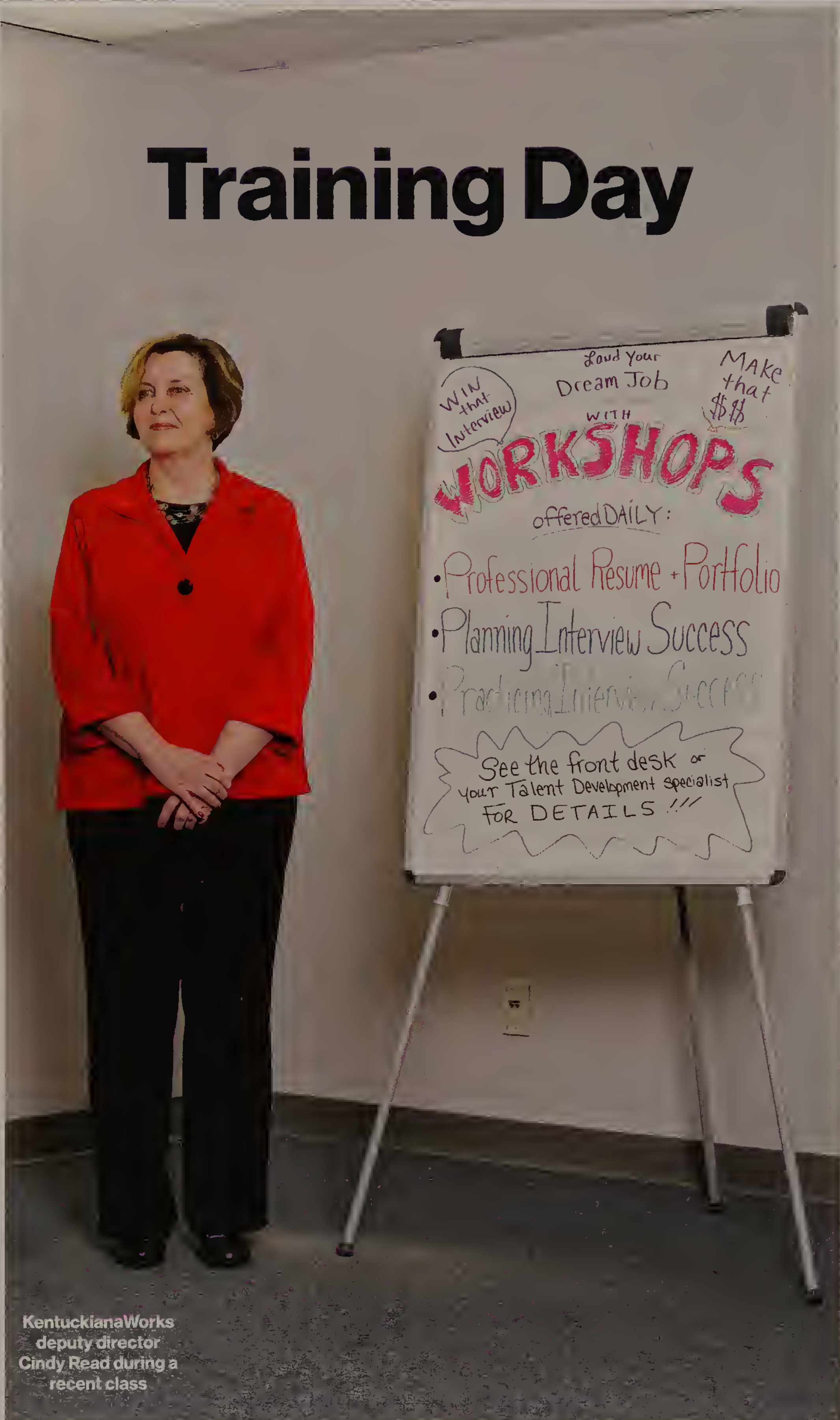
If the negotiations collapse, May says, she'll walk away without a new commercial framework in place rather than accept a bad deal. All this makes the likelihood of a disruptive breakup "worryingly high," says Malcolm Barr, an economist at JPMorgan Chase & Co.

May will also need to handle growing threats within the U.K. Scotland's government is demanding a new independence referendum, which it wants to hold before Britain leaves the EU, while the power-sharing administration in Northern Ireland is also in peril. "This is about as good as it gets for May," says Mujtaba Rahman, managing director at political consultant Eurasia Group. "Politics are about to get decisively more difficult." —*Tim Ross and Ian Wishart*

The bottom line By seeking an early start to Brexit talks, May risks handing over the advantage to the negotiating team for the EU.

Edited by Christopher Power
Bloomberg.com

Training Day



KentuckianaWorks deputy director Cindy Read during a recent class

▶ **A jobs program helps Americans get back into manufacturing**

▶ **"Once they're hired we can expand their knowledge"**

James Michael Logsdon, a Louisville auto mechanic, hadn't been in a classroom in 40 years when his company went out of business in 2015, but he was keen to learn something new. He enrolled in a free program for blue-collar workers at KentuckianaWorks, a regional job-services group that offers education and training courses and connects students with prospective employers. In five weeks, he got certified production technician (CPT) training and was hired weeks later at **Atlas Copco AB**, the Swedish tool-and-equipment maker.

"I had a long interview, but it wasn't until I talked about the courses I'd taken and showed my grades that they wanted me," says Logsdon, 59, who now repairs tools used by automakers and equipment manufacturers.

Donald Trump promises to bring factory jobs back to the U.S. from overseas, but many blue-collar workers are hurt more by a lack of skills than by globalization. Unskilled assembly-line work has been replaced by so-called advanced manufacturing jobs that require some computer, information technology, or other technical knowledge. In Detroit, Louisville, Grand Rapids, Mich., and other manufacturing hubs, many employers can't find workers with those skills.

"Manufacturing jobs are here and growing in numbers, but you can't just show up at a plant after high school and get hired any longer. You need some specialized training and certifications," says Chauncy Lennon, head of Workforce Initiatives at **JPMorgan Chase & Co.**, which helps fund KentuckianaWorks as part of a $250 million commitment to support training for manufacturing, health-care, and other middle-income jobs. KentuckianaWorks' other funders include the Louisville Redevelopment Authority, the National Fund for Workforce Solutions, and several foundations.

Over the next decade, 3.4 million manufacturing jobs are expected to become available as baby boomers retire and economic growth spurs work opportunities, according to a 2015 study by the Manufacturing Institute, a

Disney gears up for grown-ups 20

Intel self-drives into the fast lane 21

Washington-based think tank, and Deloitte LLC. But a skills gap could result in 2 million of those jobs staying unfilled. Workers are most lacking in computing and technical skills, as well as basic math and problem-solving, the study found. More than 80 percent of 450 U.S. executives surveyed said the gap will affect their ability to meet customer demand, and 78 percent said it will make it more difficult for them to use new technologies and increase productivity.

88%

Share of U.S. manufacturing jobs lost to increased productivity and automation, 2000 to 2010

"If you're wrapping 300 Hershey chocolate kisses a minute, you need to know how to use a robot, and if you're making tiny instruments for medical equipment, you need to understand mechatronics," says Fred Dedrick, president and chief executive officer of the National Fund for Workforce Solutions, a nonprofit that works with 32 job-training programs across the country. "Some big companies have closed and left devastation, but it's inaccurate to say there aren't opportunities in manufacturing," he says.

To ensure that its curriculum meets employers' needs, KentuckianaWorks, which has an annual budget of about $700,000, enlisted local manufacturers, including **Cardinal Aluminum**, **Ford Motor**, and **Kellogg**, to help design two training programs: the five-week CPT course and a basic two-week version.

Both programs are intensive and have trained people age 18-60. Only 56 percent of those who start one stick with it to the end, but those who do usually find jobs quickly. Since 2014, when the training was launched, 973 graduates have been hired at partner companies at an average salary of about $13 an hour. Cindy Read, deputy director of KentuckianaWorks, says most are entry-level production jobs, "but if you've had the discipline to train and get credentials, and then you stick it out on a job and are willing to learn, you can move up quickly."

That's the case at **KCC Cos.**, a metal fabricator with 350 employees that makes commercial roof products and heating, ventilation, and air-conditioning units. The company has hired 10 KentuckianaWorks graduates in the past year. "The basic training they get sets them apart from other entry-level candidates, and once they're hired we can expand their knowledge," says Michael Kopp, a KCC recruiter. He attends at least one session of every course to meet trainees and talk about the company. Kopp also keeps in touch with instructors. "Not everyone we've hired has worked out," he says, "but our retention success rate with these trainees is higher than with other hires."

Logsdon, the former auto mechanic who works at Atlas Copco, says he was "as green as you can be" when he started the training, after losing his job with a small family-run repair shop. He'd never worked on a computer and had to learn Windows and Excel quickly, because the curriculum was online. Classes ran from 8 a.m. to 5 p.m., and there were tests every Friday. "I got more than the CPT certificate. I got confidence, mentoring, and help writing a résumé," he says.

Initially, Atlas Copco, which found Logsdon's résumé online, offered him a temporary job repairing tools for $17.50 an hour, 30 percent less than what he'd earned as a mechanic. Still, he jumped at the chance to work for a growing company where workers are encouraged to make decisions and, he says, "solve our own problems."

An instructor demonstrates how to use an ohmmeter, which measures electrical resistance

In November, Logsdon was offered a permanent job with benefits. He plans to keep working as long as he can. "I put in 10-hour days here, starting at 5 a.m.," he says, "and I've never been happier in a job." —*Carol Hymowitz*

The bottom line Over the next decade, as 3.4 million manufacturing jobs become available, a skills gap could result in 2 million staying unfilled.

Retailing

Now on EBay: Russian Micro-Multinationals

▶ **The online marketplace makes cross-border sales easier**

▶ **"Emerging markets are an important growth opportunity"**

When Dmitrii Dvornikov first started selling jewelry and table clocks made from semiprecious Russian stones such as burgundy-colored eudialyte or lilaceous charoit, he had a hard time expanding beyond local industrial fairs and exhibitions. Then in 2013 **Shungite.Club**, his St. Petersburg-based company, began listing its wares on EBay, and the online marketplace soon turned the tiny outfit into a multinational of sorts. "In the second half of last year, EBay let us automatically show our goods in French, Italian, Spanish, German, and other languages, without separately registering in those countries," says Dvornikov. The result: a sales boost of as much as 30 percent. "This became a sustainable business with stable revenue."

The big cross-border gains logged by sellers such as Dvornikov highlight the success of a strategy put in place by Ilya Kretov, who oversees **EBay Inc.**'s Russian operations. After Kretov last year introduced software aimed at making it easier to sell abroad, the company says exports of everything from hand-painted scarves to fishing lures and collectible $30 tin soldiers listed by Russians on EBay rose 50 percent. That jump caught ▶

◀ the eye of top managers back in California, who recently gave Kretov responsibility for about 120 countries across Africa, the Middle East, and less-developed parts of Europe, with orders to boost cross-border sales in those markets, too. "We are basically the only marketplace that enables merchants from emerging markets to sell globally," Kretov says.

In recent years, EBay has expanded more slowly than industry leaders **Amazon.com Inc.** and **Alibaba Group Holding Ltd.** The company says cross-border e-commerce can take off in developing nations just as it has in China, where shoppers lead the world in ordering goods directly from merchants abroad. Chinese consumers are projected to spend $158 billion online on imported goods in 2020, up 84 percent from 2016, according to researcher EMarketer Inc. Cross-border sellers could help EBay turn in better revenue growth than the sub-5 percent it delivered last year—one-sixth of Amazon's 27 percent increase. "Emerging markets are an important growth opportunity for EBay," says Colin Sebastian, an analyst at Robert W. Baird & Co. "If they can build and leverage a buyer base in these countries, then I would expect there will also be a ready market of sellers."

"Emerging markets are an important growth opportunity for EBay. If they can build and leverage a buyer base in these countries, then I would expect there will also be a ready market of sellers."
—Colin Sebastian, Robert Baird analyst

Unlike Amazon, which gets most of its sales in North America, EBay relies on international markets for about 57 percent of its revenue. As of mid-2016, 38 percent of EBay's 1,000 most-active sellers were cross-border traders, according to researcher Web Retailer. In many places, though, EBay means domestic listings: Americans mostly sell to Americans, Britons mostly to U.K. customers, etc.

Last year, Kretov rolled out software dubbed EBayMag that lets sellers offer their goods in as many as nine countries and automatically translates listings into local languages—free for a trial period, though the company eventually plans to charge extra. Previously merchants could readily sell only on their local site or the global EBay.com site. Kretov says it's easier for the company to expand into untapped markets because its business model connects small merchants to buyers, and it doesn't need to build warehouses or shipping centers.

Fedor Virin, an analyst at researcher Data Insight, says EBay's push to help Russians export came after it failed to become a popular domestic marketplace there. EBay has only about 3 million monthly users out of the 80 million people online in Russia, according to researcher Mediascope. By contrast, Alibaba's AliExpress has more than 11 million monthly active users in Russia. And in many other global markets Kretov is targeting, EBay barely has a footprint, Virin says. "By focusing on cross-border sales," he says, "EBay can squeeze growth from markets like Russia." *—Ilya Khrennikov and Spencer Soper*

The bottom line Exports by Russians using EBay grew 50 percent in 2016, thanks to software that makes it easier to sell to foreign buyers.

Media

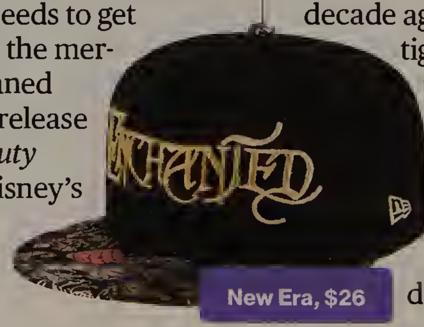
Beauty and the Bakeware Set

▶ **The new Disney film targets millennials for merchandise sales**

▶ **"This is probably priority No. 1 for us." It's "the generational pull"**

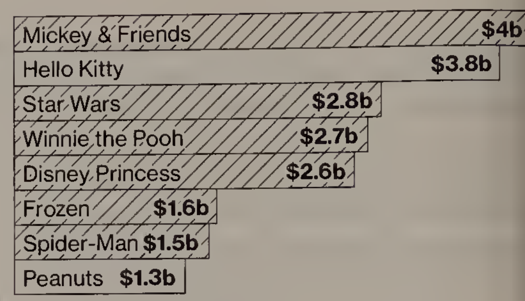
It's half past noon on a Saturday, and a couple of dozen kids and their parents are gathered at the Disney Store in Sherman Oaks, Calif., for a *Beauty and the Beast* event. Music from the film plays, and kids are handed pieces of paper they can fold into the Chip Potts character. "Let me hear you roar like the Beast," a Disney staffer urges. The audience roars along.

Walt Disney Co. needs to get everyone's buy-in for the merchandising push planned around the March 17 release of the live-action *Beauty and the Beast* redo. Disney's consumer-products division, the largest entertainment



New Era, $26

Top Toy Licenses



2015 GLOBAL RETAIL SALES. DATA: THE LICENSING LETTER

licensing operation in the world, has been on a tear in recent years, thanks to the billion-dollar bonanzas *Frozen* and *Star Wars*. Sales of products tied to those films, though, have cooled recently; and last quarter, which included the crucial Christmas season, the company's merchandise revenue fell 23 percent, to $1.5 billion.

Disney consumer-products chief James Pitaro's strategy for getting the division back in growth mode is to broaden the audience for merchandise. In particular he wants to peddle gear to millennials who grew up watching Disney films and now want to relive their childhood or share the stories with their own kids. "This is probably priority No. 1 for us," Pitaro says. "This idea we call the generational pull."

There's already plenty of the more predictable kid-focused merchandise on store shelves: $23 sparkly yellow dresses, posable $26 dolls, $9 Belle water bottles. And this fall, **Hasbro Inc.** will roll out a $120 programmable Belle doll that dances and sings after kids type a code into a related mobile app.

Launching a slew of tie-ins aimed at goods that would actually suit millennial moms required some new thinking. Step 1, Pitaro says, was to target higher-end labels that create a "halo" around the *Beauty and the Beast* brand. These include **Juicy Couture**, which is making $700 track jackets, and **Invicta**, with $500 watches. Disney also signed up prominent London-based runway designer Christopher Kane—who a decade ago caused a stir with his tight bandage dresses—to put together a line that includes $245 *Beast* T-shirts and a $6,000 women's silk jacket with a blue bow. Kane sees a natural flow between girls dressing up in twirly yellow dresses and women in fancier

duds. "There's always a mix of fantasy in fashion," he says.

For non-fashionistas, Disney has lined up more practical *Beast* tie-ins including **Twinings** tea bags, **Neutrogena** sunblock, and a $280 **Le Creuset** soup pot sold exclusively at Williams-Sonoma. "It appeals to those who grew up watching the original film," says Janet Hayes, brand president at **Williams-Sonoma Inc.** "I think the finishing touch on the handle of the lid saying 'be our guest' is a great touch."

In a first for a Disney Princess line, Pitaro's team is also aggressively targeting male customers. Licensee **Cufflinks Inc.** is selling rose-patterned ties, teen retailer **Hot Topic Inc.** is offering men's blazers inspired by the film, and **New Era Cap Co.**, an almost 100-year-old millinery outfit, has made *Beast*-themed baseball caps for guys.

Last year, Disney's consumer-products division, which includes its own stores, earned almost $2 billion on sales of $5.5 billion. But the market for movie-related merchandise has gotten much more competitive lately. At least 23 kid-focused films will feature toy tie-ins this year, according to the International Licensing Industry Merchandisers Association. Many come from studios, such as **Warner Bros. Entertainment Inc.** and **Universal Studios**, that have hired former Disney executives to run their licensing businesses.

There's also the risk of film character merchandise fatigue. "Every seven years, entertainment toys peak and decline," says toy entrepreneur Isaac Larian, whose MGA Entertainment Inc. owns brands including Little Tikes and Bratz. "Consumers get fed up."

Pitaro, naturally, disagrees. He says the success of Disney's film operation, which produced 5 of the 10 highest-grossing movies in the U.S. last year, gives him plenty to work with. "The biggest lever that we can pull here is this idea of audience expansion," he says. "New regions, new countries, and into new demographics." —*Christopher Palmeri and Matthew Townsend*

The bottom line Disney, whose merchandise revenue fell 23 percent last quarter, hopes *Beauty and the Beast* gear for millennials will revive sales.

Edited by James E. Ellis, Dimitra Kessenides, and David Rocks
Bloomberg.com

Deal Snapshot

By Ian King and Gabrielle Coppola

Intel + Mobileye

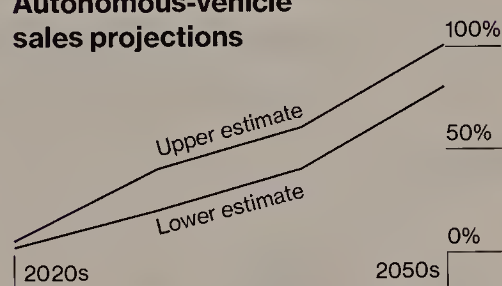
The Basics
Buyer: Intel Corp.
Target: Mobileye NV
Price:

$15b

All cash

Premium: 34 percent above closing share price of $47.27 on March 10

Autonomous-vehicle sales projections

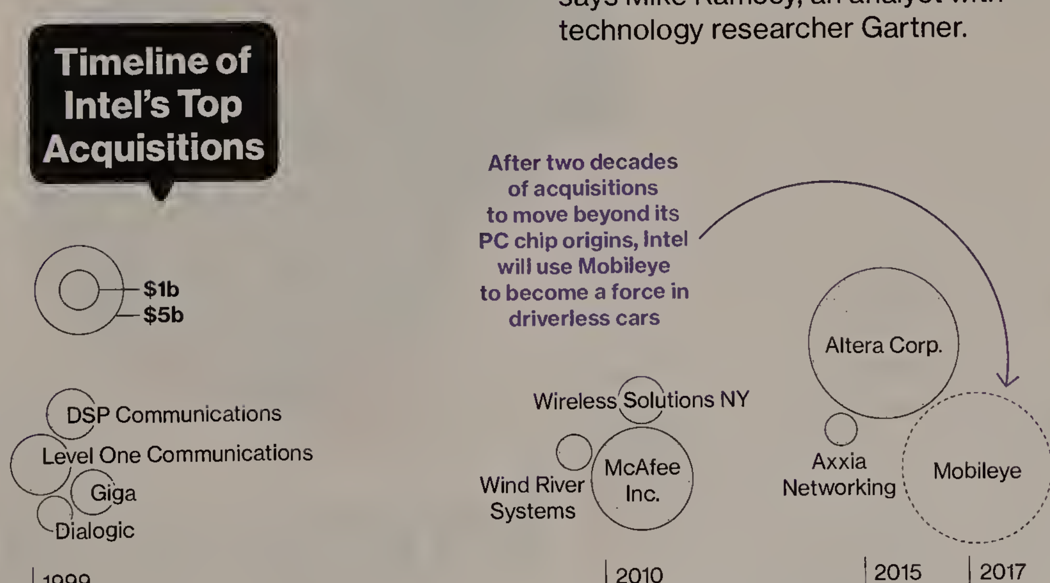


Chasing the Next Big Thing
Intel is accelerating its push into the chip industry's latest megagrowth opportunity: self-driving cars and the data they generate. Israel-based Mobileye will let Intel offer automakers a larger package of the components they'll need as vehicles become more autonomous.

Growth Market
Digital mobility services for the auto industry will reach about $2 trillion in 2025, up from $916 billion in 2016, says Sarwant Singh, a senior partner at market researcher Frost & Sullivan.

Playing Catch-Up
Intel's purchase is a shot at catching rival Qualcomm Inc., which is set to become the world's largest producer of chips used by automakers through its pending $47 billion acquisition of NXP Semiconductors NV. Intel is "so far behind in this space, the only way they could catch up was via an acquisition," says Neil Campling, head of technology research at Northern Trust Securities.

Pay to Play
Intel is intent on staying in this race, so it's paying about 29.5 times Mobileye's projected revenue for this year, according to Amit Daryanani, an analyst at RBC Capital Markets. "They're paying a huge premium in order to catch up, to get into the front of the line rather than attempt to build from scratch," says Mike Ramsey, an analyst with technology researcher Gartner.



DATA: VICTORIA TRANSPORT POLICY INSTITUTE; COMPILED BY BLOOMBERG


FAST TRACK
MULTI-CLOUD SECURITY
BMC provides highly advanced security and privacy for all your business clouds
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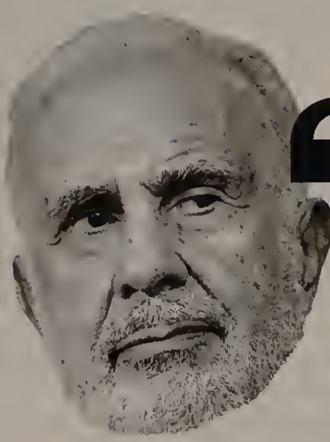
March 20 — March 26, 2017

Who can make costly regulations disappear?

Carl  'I can'

▶ How Trump's confidant became a one-man lobbying shop

▶ "This is the purest definition of a conflict of interest that you can get"

Late in the day on Feb. 27, Michael McAdams's phone lit up with a flurry of calls and messages. McAdams runs a biofuels trade group, and in the arcane world of fuel policy, the news couldn't have been bigger: The White House was considering a radical change to the U.S. renewable fuel mandate, which governs the amount of ethanol blended into the country's gasoline supply. To the surprise of many, the Renewable Fuels Association (RFA), a major trade group that represents ethanol producers, was dropping its opposition to the proposal, which would shift the responsibility for meeting biofuel quotas away from refineries. "I nearly fell out of my chair," says McAdams.

By the time he got to the office the next morning, McAdams had messages from most of his 33 members, who were worried the proposal would upend the biofuel market and dry up demand for their products. It took him almost two days to get back to them all and try to explain what was happening, to the degree that he even knew himself. "We're in an information void," he says. "There's a vacuum here on who the hell is running what."

The answer is, Carl Icahn is running things. Since Election Day, the billionaire New York investor has emerged as the most powerful person in the $24 billion ethanol industry. That's due in part to his stake in two oil refineries, but mostly it's because of his relationship with President Donald Trump. Icahn has known Trump for more than two decades and was an early supporter during the campaign. Trump rewarded Icahn in December by making him special adviser to the president on regulatory reform, giving Icahn the perfect platform to influence federal policies that affect his $20 billion business empire.

As his first agenda item, Icahn has chosen to go to war over a U.S. Environmental Protection Agency program that he says costs his refineries hundreds of millions of dollars by forcing them to buy renewable fuel credits, generated when biofuel is blended into gasoline. He doesn't want to scrap the mandate—he just wants the obligation for meeting it to move from refiners to other participants in the energy market. Ethanol producers fear a big change might unravel the whole system, which is why it was such a surprise that the RFA caved.

The switch came after a Feb. 23 visit by Bob Dinneen, chief executive officer of the RFA, to Icahn's office in New York. As he later explained in an interview with an agriculture radio show, Dinneen concluded Icahn was driving U.S. policy on the issue and couldn't be stopped. So Dinneen cut a deal with Icahn that included an item on RFA's wish list. Icahn took the joint proposal to the president.

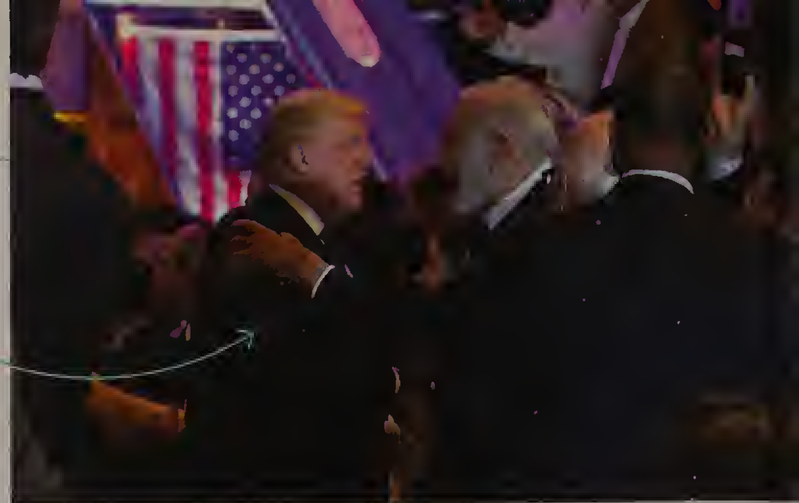
As Trump's special adviser, Icahn has power to influence policies that affect his businesses

When news of the deal broke, corn and gasoline prices went haywire, while shares of **CVR Energy Inc.**, Icahn's refinery company, surged. Although the White House and EPA have yet to act on the proposal, the market likes its chances; since Trump's election, CVR has climbed more than 58 percent, boosting the value of Icahn's majority stake by more than $500 million.

"This looks more like what you'd see in a banana republic," says Tyson Slocum of Public Citizen, a liberal watchdog group. "You've got a strongman who surrounds himself with billionaires or wealthy advisers who conduct the business of government to benefit their business."

Icahn makes no apologies for this. Sipping a glass of pineapple juice in his 47th floor corner office on March 9, the 81-year-old investor says he's surprised by all the controversy, which he sees as a fake issue generated by well-funded opponents. "I have a right to talk to the president like any other citizen," he says. "Especially if I think he ▶

HEIDI GUTMAN/CNBC/NBCU PHOTO BANK/GETTY IMAGES



Trump and Icahn at Trump Tower the night of the New York primary in April 2016

◀ respects me, why the hell shouldn't I call him?.... It may sound corny to you, but I think doing certain things helps the country a lot. And yeah, it helps me. I'm not apologizing for that."

Icahn would seem to inhabit an extraordinary position of privilege in the Trump administration. Except that he's not technically a part of the administration. As a special adviser, he's not a government employee and receives no compensation. That means he doesn't have to relinquish any of his vast financial holdings, nor is he subject to federal ethics rules that typically apply to people who work for the president.

Every part of Icahn's portfolio is touched by government regulation. There's **American International Group Inc.**, subject to strict federal oversight under a 2010 law Trump says he'll revise; **Federal-Mogul Holdings Corp.**, an auto parts maker with plants in China and Mexico; and **Herbalife Ltd.**, a multilevel marketer facing a May deadline to comply with a Federal Trade Commission settlement. Says Slocum: "This is the purest definition of a conflict of interest that you can get."

Last month, seven Democratic senators wrote the White House asking for information about Icahn's role in EPA policy. "With a sprawling business empire and potentially unlimited portfolio in the administration," the senators wrote, "Icahn's role presents an unacceptable risk of further real or potential conflicts." As of March 14, they hadn't gotten a response.

One of the original corporate raiders of the 1980s, Icahn is still in the business of shaking up companies he sees as poorly managed, although he now prefers the gentler term "shareholder activist." A self-described workaholic, with a pair of dueling pistols on his desk, he bagged his latest quarry this month, forcing out the CEO of AIG.

Icahn says the EPA rule is just one of innumerable regulations "strangulating" the economy. Pressed for examples, he mentions those governing liquefied natural gas, key to his billion-dollar stake in **Cheniere Energy Inc.**, and the Federal Railroad Administration, which he's battling in federal court over the safety of tank cars one of his companies built.

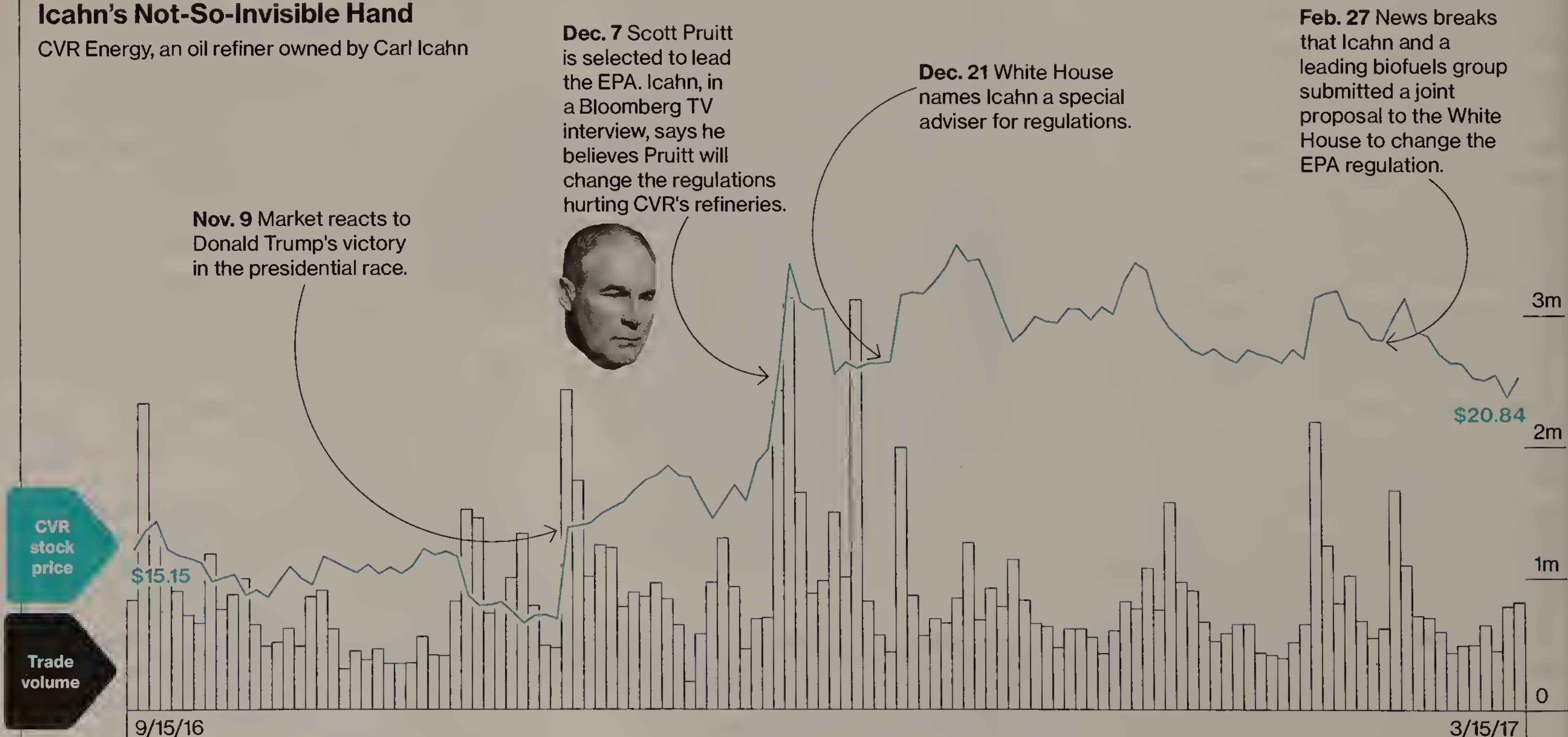
As a major player in the stock and bond markets, Icahn has an interest in the direction of the Securities and Exchange Commission. He says Jay Clayton, the lawyer Trump picked to lead the agency, stopped by his office for a brief chat in early January, on the same day Clayton's selection by Trump was made public. Icahn insists he hasn't talked to the administration about any other regulatory issues outside those pertaining to the SEC and EPA.

Icahn and Trump go way back, and not surprisingly the nature of their relationship is mostly business. In the early 1990s, as a creditor of the Taj Mahal, Icahn helped Trump keep control of his troubled Atlantic City casino. At campaign rallies, Trump bragged about Icahn's endorsement, calling him one of the "greatest businesspeople in the world." For a president surrounded by captains of industry, Icahn is by far the wealthiest, worth about $20 billion, according to the Bloomberg Billionaires Index, more than the rest of Trump's appointees combined.

Within days of his victory, the president-elect ended a Trump Tower interview with Scott Pruitt, his future EPA chief, by directing him two blocks

Icahn's Not-So-Invisible Hand

CVR Energy, an oil refiner owned by Carl Icahn



DATA: COMPILED BY BLOOMBERG

uptown to meet with Icahn. "He has some questions for you," Trump told Pruitt, according to a person with knowledge of the meeting. The Icahn interview hadn't been on Pruitt's schedule, according to the person. So Pruitt and an aide scanned the internet for information about Icahn's pet ethanol issue as they headed up Fifth Avenue.

Icahn's trouble with the biofuel mandate is that importers and refineries are forced either to blend ethanol into their gasoline or buy renewable-fuel credits from others that do. Icahn's refineries in Oklahoma and Kansas mostly rely on buying credits, which was fine until the price of the credits soared. Under the current system, Icahn says, independent refiners like his are handing windfall profits to those who sell credits, including big gas station chains such as **Royal Dutch Shell Plc**. "It's an outrage," says Icahn. "It's a deal that in a Third World country would make a dictator blush."

Over the course of two meetings and more phone calls with Pruitt, Icahn says Pruitt seemed supportive. At his Jan. 18 confirmation hearing, Pruitt testified that he hadn't taken a position on the issue. But a few days after Pruitt took office last month, Icahn was working on a plan to force the EPA chief's hand. Armed with the support of the RFA, Icahn called the president with the joint proposal, finally connecting one evening while Icahn was out walking his dog. Trump seemed receptive, Icahn says, adding that it's the only time they've discussed the issue since the inauguration. Trump told Icahn to call Gary Cohn, director of the National Economic Council. Cohn, in turn, handed him off to an aide, who spent more than an hour on the phone with him.

The following week, when news of Icahn's gambit leaked out, the backlash was swift. "This is not going to happen," said Iowa Governor Terry Branstad, a Trump ally. Alarmed farm state senators started questioning Trump aides. Before long, the White House issued a statement saying no executive order was in the works. (The EPA didn't respond to requests for comment.)

Back at the General Motors Building on March 9, stretching his 6-foot-3-inch frame and folding his hands behind his head, Icahn says he still hopes Trump and Pruitt will take his side over the EPA rule. But he allows that the controversy generated by his involvement may have hurt his cause. He regrets taking the special adviser title because he says it's become a PR distraction. "I gotta tell you," he says, "I didn't count on all of this opprobrium." *—Zachary Mider and Jennifer A. Dlouhy*

The bottom line As special adviser to Trump, Icahn can influence regulatory policies that affect his $20 billion portfolio without violating ethics rules.

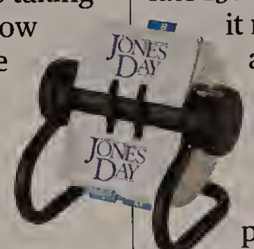
Governing

Donald Trump's Favorite Law Firm

▶ **Jones Day attorneys fill key posts in the new administration**

▶ **"It is a little like a sports team losing major players"**

When prominent lawyers take top jobs at the White House or the U.S. Department of Justice, they often bring along several attorneys from their firms. With the Trump administration, one firm—Jones Day—is taking that to an extreme. "I don't know of a precedent," says Theodore Olson, a solicitor general in the George W. Bush administration and a partner in the Washington office of Gibson, Dunn & Crutcher.



So far, at least 14 Jones Day attorneys have joined the Trump team, although some are awaiting Senate confirmation. Donald McGahn II, the White House counsel and a former Jones Day partner, has hired at least six attorneys from the firm to work with him advising the president on ethics, executive orders, and judicial nominations. McGahn, a former chairman of the Federal Election Commission and the main bridge between Jones Day and the administration, has represented Trump since 2015, when the president was a long-shot candidate.

At Justice, at least four Jones Day lawyers have been named to prestigious posts, led by Noel Francisco, another former partner at the firm, who the White House announced on March 7 would be nominated as solicitor general, the administration's chief advocate at the Supreme Court. Francisco's post requires Senate confirmation. Other Jones Day attorneys have been appointed at the Commerce and Agriculture departments and the Federal Energy Regulatory Commission.

Despite some of its attorneys' enthusiasm for serving in the Trump administration, Jones Day's lawyers contributed only $7,422 to his campaign, according to the nonprofit Center for Responsive Politics. That compares with $267,899 given to Hillary Clinton.

A behemoth with more than 2,500 attorneys in 44 offices in 19 countries, Jones Day has raised its profile as a Washington powerhouse over the past dozen years. In a closely watched measure of status in legal circles, it employs more than 40 former Supreme Court clerks, including Francisco, who clerked for Justice Antonin Scalia.

Jones Day's revenue of $1.94 billion in 2015 ranked sixth among the top 100 firms in the *American Lawyer*'s most recent rankings. Partner compensation at Jones Day varies widely; the average take-home pay of just over $1 million earned a ranking of only 72nd.

The firm's roots can be traced to the late 19th century in Cleveland, where it represented railroads, utilities, and Standard Oil mogul John D. Rockefeller. More recently its stable of clients has reached beyond Midwestern industrial and financial companies to include **Chevron**, **Goldman Sachs**, **Reynolds American**, **Southern**, **Starbucks**, **Toyota**, and **Volkswagen**. It also represents Bloomberg LP, the owner of *Bloomberg Businessweek*.

Rivals say Jones Day will benefit from its prominence in the administration. Firms such as Jones Day "generally get their lawyers back having had high-level government experience and boosted their name recognition," Karen Dunn, a partner in the Washington office of Boies Schiller Flexner who served as an associate counsel to President Obama, said in an email. William Burck, a former deputy counsel to President George W. Bush and a partner in the Washington office of Quinn Emanuel Urquhart & Sullivan, said in an email that Jones Day gave up some of its top talent to the administration: "Noel Francisco is one of the best appellate ▶

◀ lawyers in the country, and Greg Katsas, the deputy White House counsel, is a brilliant legal thinker."

That could be a problem, Victor Schwartz, the head of Shook, Hardy & Bacon's public policy practice in Washington, said in an email: "If too many key lawyers leave the firm at the same time, it is a little like a sports team losing major players." Jones Day probably has a deep enough bench to weather the temporary departures. While McGahn and Bill McGinley, cabinet secretary in the Trump White House, were two of Jones Day's top election law experts, Benjamin Ginsberg, the Republican *éminence grise* of the field, remains at the firm. Jones Day's managing partner, Stephen Brogan, and a spokesman didn't respond to phone messages and emails seeking comment.

Political scandal poses another potential danger for law firm transplants. "There is always a risk that applies to any administration and any firm that controversy will taint members of the administration," says Olson. In just its first two months, the Trump White House has gotten enmeshed in potentially explosive controversies concerning contacts between Trump associates and Russia and the president's unsupported allegation that Obama tapped his phone in New York.

A less extreme but far more common hazard facing government attorneys with private firm backgrounds is the obligation to recuse oneself because of conflicts with the firm's work. This occurred in the Trump administration's biggest court case so far: the defense of the president's first travel ban. Francisco, then the acting solicitor general, and Chad Readler, another Jones Day émigré and acting assistant attorney general, had to step aside in early February and allow a career Justice Department lawyer to defend the president's order barring U.S. entry to people traveling from seven Muslim-majority countries. The recusal became necessary when Jones Day lawyers back at the firm filed a brief on behalf of legal scholars who argued against the administration's expansive claim of authority to bar certain aliens from the country.

The administration ultimately lost before the U.S. Court of Appeals for the Ninth Circuit in San Francisco. Trump has since issued an altered immigration order that's been challenged in the courts—and could force more recusals. *—Paul M. Barrett*

The bottom line Jones Day, a haven for conservative attorneys in Washington, so far has sent 14 lawyers into the Trump administration.

Jones Day law firm

Founded 1893, as Blandin & Rice

Number of lawyers 2,500+

2015 revenue $1.94b

Average partner profits $1.01m per year

Revenue per lawyer $755,000

Number of offices 44 (in 19 countries)

Clients include

Chevron

Goldman Sachs

[redacted]

Elections

Does Macron Hold the Key to Merkel's Heart?

▶ **Franco-German ties need to strengthen for the EU to survive**

▶ **"Macron makes proposals that sound so normal to German ears"**

A snowstorm on the East Coast of the U.S. upended Angela Merkel's travel plans, delaying until March 17 her scheduled Washington meeting with President Donald Trump. One appointment that stayed on the chancellor's calendar, though, was a March 16 tête-à-tête in Berlin with French presidential candidate Emmanuel Macron.

Merkel has good reason to reach out to Macron. The 39-year-old independent centrist now looks to be in position to defeat the far-right National Front's Marine Le Pen, whose anti-Europe views are anathema to Merkel. Only two months ago, Merkel hosted then-front-runner François Fillon, whose center-right Republican party is the traditional ally of her Christian Democratic Union. But Fillon's support crumbled over allegations that he hired his wife and children for no-show parliamentary jobs. He was formally charged with misuse of public funds on March 14. Recent polls suggest Fillon will be eliminated in the first round of voting on April 23, with Macron then defeating Le Pen in a May 7 runoff.

"This could be a new chance to re-trigger the French-German relationship." —*Matthias Ruffert, Humboldt University*

For Germany, a Macron victory could offer far more than a firewall against Le Pen. The Franco-German partnership that formed the European Union's historic core has been strained in recent years, as President François Hollande balked at Merkel's austerity-based management of the European debt crisis and irked Berlin with slow deficit cutting and tepid economic reforms that fell far short of those enacted by Germany. Macron impressed the Germans by pushing for reforms during his stint as Hollande's economy minister and by pledging to meet the 3 percent deficit ceiling set by euro currency rules—something none of his rivals has promised. "Macron makes proposals that sound so normal to German ears," says Matthias Ruffert, a professor of European law at Humboldt University in Berlin. "This could be a new chance to re-trigger the French-German relationship."

Europe needs that relationship more than ever. Britain is exiting the EU, a NATO skeptic occupies the White House, and there's an increasingly assertive Russia to the east. Those factors, along with resurgent populism, have "created a sense of alarm about the European project," says Christian Bluth, an economist at the Bertelsmann Stiftung think tank in Gütersloh. "The idea of Europe needs to be reinvigorated and made more attractive. That can only be done if it is done together with the French."

Macron has taken pains to reassure Germans that he's ready to enforce discipline at home. "There is a French responsibility to fix the situation," he said at Humboldt University on Jan. 10. "We have to restore trust with Germany" by enacting "strong reforms to realign our economy with the German success." In campaign speeches he argues that France should work within European structures—rather than erecting trade barriers or quitting the euro currency, as Le Pen wants to do—to protect working


Macron

Real Estate The Most Expensive Building in NYC

The company owned by the family of Jared Kushner, President Donald Trump's son-in-law and senior adviser, stands to receive more than $400 million from a prominent Chinese insurance company that's considering investing in the Kushners' marquee Manhattan office tower at 666 Fifth Ave. The proposed $4 billion transaction includes terms that some real estate experts consider unusually favorable for the Kushners. The partnership is seeking additional participants through a federal program known as EB-5, which is intended for economically distressed neighborhoods and provides visas to major foreign investors. —*David Kocieniewski and Caleb Melby*

$4b
Total value of transaction

$2.85b
Total value of the building, making it the priciest ever sold in NYC

$1.15b
Debt refinanced

$400m
Payments from Anbang Insurance Group Co. to the Kushner family

DATA: FINANCIAL DISCLOSURES FILED BY THE BUILDING'S LENDERS

people from the ravages of globalization. To Germany's relief, he's taken a tougher stance on Russia than Le Pen or Fillon, both of whom want to lift sanctions on Moscow. And while Le Pen and Fillon don't want France to take more refugees, Macron has called for an immigration policy "that would be efficient, clear, and carried out with our European partners."

In exchange for such moves, Macron has said he wants Germany to loosen its purse strings and pursue "a much more growth-friendly policy." Merkel is unlikely to grant that wish quickly. Backtracking on long-standing austerity positions could alienate her center-right base as she faces a tough reelection challenge this year from the Social Democrats' Martin Schulz. And Macron's reforms and budget cuts may disappoint the Germans. Unlike the neo-Thatcherite Fillon, who's promised to raise the retirement age from 62 to 65 and eliminate the 35-hour workweek, Macron would simply make it harder for public employees to retire early and give companies more flexibility to negotiate schedules with their workers. Fillon wants to cut public spending by €100 billion ($106 billion) over five years. However, he wouldn't immediately lower France's budget deficit below the 3 percent limit, since he's proposed deep tax cuts that would shrink revenue. Macron has promised only modest tax cuts.

France and Germany "have not been seeing eye to eye for a long time," says Roland Freudenstein, policy director at the Wilfried Martens Centre for European Studies in Brussels. "The strategic differences on economics, and the role of the state in the economy and international trade, are so deep and widespread, one French president cannot change that."

Still, the timing could work in Macron's favor. Euro zone growth is ticking upward, with the French economy expanding at its fastest rate since 2011. Annual growth from 2017-19 could "trend towards 3 percent," double the pace during Hollande's term, says Martin Malone, an investment adviser at London brokerage Mint Partners Ltd. "Macron may or may not deliver, but the positive tailwinds are very likely to make his traction better."

While Germany still expects its European neighbors to live within their means, "there will be more leeway," says Bluth. "Austerity won't be as important" as it was during the years of the debt crisis. That, he says, could help "the French-German engine get back to work, being a constructive force in propelling Europe forward." —*Carol Matlack and Mark Deen*

The bottom line Germany is betting on Emmanuel Macron to keep the anti-European Marine Le Pen out of the Elysée Palace.

Edited by Matthew Philips
Bloomberg.com

Bravemind's VR retains a video game style to protect patients from further distress

Real Trauma, Virtual Therapy

▶ Bravemind's VR system is designed to help veterans deal with traumatic memories

▶ "I got it off my chest, and now I can work on it"

"Is there blood and guts, as well?" one of the four psych clinicians asks during the virtual-reality demo, as a simulated explosion on an Iraqi street wreathes his convoy in dust and flames.

"We've got blood and guts," confirms Albert "Skip" Rizzo, swiveling his head around, a graying ponytail yo-yoing behind him. "It's something we try not to use. But we have it."

The VR images on Rizzo's proprietary headsets aren't meant for the *Call of Duty* crowd. Rizzo runs Bravemind, an academia-Pentagon venture that makes VR hardware and software for veterans of Iraq and Afghanistan. "It's about confronting your past and moving past it," says the 62-year-old, motorcycle-riding, Uggs-wearing Ph.D. "A medical VR version of prolonged exposure therapy."

Rizzo's subjects are soldiers whom traditional therapy has failed. About 1 in 5 of the 2.7 million veterans of Operations Iraqi Freedom and Enduring Freedom remain psychologically scarred by roadside bombs, surprise attacks, the guilt of taking a life or failing to save one. It's a group plagued by post-traumatic stress disorder (PTSD), often hidden because it still carries a stigma in the military's macho culture. VR is becoming a lifeline for some of the veterans struggling to readjust to civilian life.

Bravemind uses computer-generated imagery accompanied by realistic sensory stimuli—sounds, vibrations, even smells provided by a machine loaded with vials of scents—to approximate the circumstances of a veteran's traumatic memories. The software's 14 environments, ranging from remote Afghan villages to crowded Baghdad markets, include attackers, bombs, and innocent bystanders. They're "filled with so much stimuli that it's difficult to avoid engagement," Rizzo says, and the exposure helps force patients to confront and deal with their trauma. Clinicians can tweak the intensity of a scene by toggling details like smoke, fire, and violence.

Unlike those in some high-end VR, the scenes aren't quite photorealistic. That's by design: The software is lifelike enough to force patients to relive and come to terms with troubling moments, but it retains enough of a video game-style look to protect them from further trauma. "Your mind fills in the details for you," says Chris Merkle, a former Marine and Bravemind patient. "Think about the worst day of your life. Every time you describe it, it normalizes it."

Merkle spent 14 years overseas on seven tours and says he'd go back today if he hadn't aged out of service. Once home, he was angry, explosive, eventually desperate. His Department of Veterans Affairs therapist suggested he apply for the Bravemind program. "It's almost like a confessional," says Merkle, now working in mental health outreach at the VA while studying to become a therapist. "I got it off my chest, and now I can work on it."

Bravemind's synthesis of clinical psychology and VR dates to the early days of the Iraq War in 2003. At the University of Southern California, Rizzo had built a fledgling VR lab to treat brain injuries and attention-deficit hyperactivity disorder, and he pitched the PTSD applications to USC's Institute for Creative Technologies. The institute, funded by the U.S. Army Research Laboratory, is home to Light Stage, a setup used to create the visual effects for *Avatar*.

The government committed about $5 million to initial development, with which Rizzo's team finished a prototype in 2007. They built a second model in 2013, around the time **Oculus VR LLC** founder Palmer Luckey interned at Bravemind. (He duct-taped an early Oculus Rift together there.) About 100 U.S. military facilities now use Bravemind's equipment, making it one of the widest-ranging programs in the nascent field of VR health care, used to treat thousands of vets. "We teach them coping skills," says Rizzo.

The process isn't easy, says Todd Abramson, Bravemind's lead therapist at the Long Beach, Calif., VA. "You have to build rapport and trust fast, because we get into exposure in Session 3," he says. "Those first two meetings, I've got to do my best to connect with this person. I have to be real and honest."

A typical course of treatment runs for 10 weekly sessions, with a follow-up three months later. A more intense version runs twice a week for five weeks. Either way, the results suggest that participants' stress symptoms, including depression, decrease by as much as 80 percent. In cases where it doesn't work, veterans are referred back to conventional therapy.

The Pentagon has committed $12 million to a six-year clinical study comparing Bravemind's effectiveness with other treatments, a key hurdle to wider adoption. The Canadian military recently bought a handful of Bravemind systems with Canada-customized software for about $400,000, and Rizzo says he's in talks with the Danish military to buy the U.S.-standard systems for about $5,000 each.

Bravemind has found favor among tech companies, too. In December, **Advanced Micro Devices, Dell, Valve Corp.**, and **Intel** paid to donate 10 sets of Rizzo's gear to 10 VAs in need. That kind of help may cushion the USC lab if it's targeted by the Trump administration, which has signaled plans to slash federal science research. Rizzo says he's pursuing other sponsorships.

He's also interested in trying to broaden the medical uses of VR, which some hospitals are testing to help patients manage pain. Bravemind's model is also being used to treat military victims of sexual trauma, and Rizzo has experimented with fear reduction for phobias and therapies for addiction, autism, Parkinson's, and more. "There's something about immersion that matters," he says. —*Adam Popescu*

The bottom line Bravemind's veteran-focused VR hardware and software are used at more than 100 military bases, hospitals, and other sites.

Startups

$400 Million Richer By Pinching Pennies

▶ **Online grocery deliverer Instacart vows to stretch its new funding**

▶ **Many workers think a new service fee "is a way to steal our tips"**

Apoorva Mehta has been thinking a lot about bottle deposits. Recycling fees vary by state and size, but until recently his online grocery delivery startup, **Instacart Inc.**, hadn't paid much attention to what it charged customers buying beer or soda. Then, the company says, it did the math and discovered this cost it an average 35¢ on each delivery. Instacart now charges the right amount for deposits. Last year it also adjusted how it accounts for local sales taxes, saving another 20¢ per delivery.

On March 8, Instacart said it had raised a fresh $400 million in venture capital, and its recent penny-pinching had a lot to do with that. Mehta says his backers, a who's who of Silicon Valley venture firms, took a much closer look than usual at the company's finances, seeking more evidence that it can rise above the pile of on-demand startups that have bled VCs for years. "One of the things we've had as a result of this round is a lot of scrutiny," Mehta says. Instacart passed the test: The cash infusion increased the company's valuation from $2 billion to $3.4 billion, despite the down market for similar businesses.

Instacart still loses money but cut its losses by more than half in the past year, Mehta says. Monthly sales are nine times what they were when its last funding round closed two years ago, he says, though he wouldn't give specific numbers. The company shortened delivery times by filming its most efficient shoppers—the contractors who buy and deliver the groceries—and teaching others their tricks.

Other changes angered workers. In October, Instacart said it was ditching the app's tip option for a default "service fee" of 10 percent, to be divided evenly among shoppers. Some shoppers, many of whom made about half their income from tips, accused the company of trying to siphon that money for itself. Instacart ultimately added the service fee and kept a supplementary tipping option, but made it harder to get to in the app.

Longtime Instacart workers "still think that the service fee is a way to steal our tips," says Simon Kwok, a shopper in Seattle who blogs about on-demand work. Mehta concedes that Instacart collects the fees, but says they help cover labor costs, and some shoppers now make more.

"One of the things we've had as a result of this round is a lot of scrutiny." —*Apoorva Mehta, CEO, Instacart*

Back-office staffers are focused on fee revenue from grocery chains like **Whole Foods Market Inc.**—already their biggest source of income—and ad revenue from consumer brands, still a newish endeavor. **Kimberly-Clark Corp.**, which makes Kleenex and Kotex, has tried a few kinds of Instacart ads. Last year it paid about $20,000 for a four-week banner ad in the app that pitched Cottonelle to ▶

◀ people browsing for paper goods, says Francisco Silva of Kimberly-Clark. Silva says he had better luck with campaigns in which the company covered delivery fees for customers buying, say, $25 worth of Huggies diapers.

Instacart is still experimenting. In January it started offering promoted search results, like those on Google. Companies pay when a customer clicks on an ad or puts its products in their shopping cart. For small businesses it's an attractive option, but costs can add up fast, says Emily Hsiao, senior brand manager for **Bare Snacks**, which makes chips out of apples, bananas, and coconuts. At $1 a click, Hsiao ran through her budget in no time.

Like any e-commerce business, Instacart has to worry about **Amazon.com Inc.**, which is pushing into fresh food delivery. Mehta is trying to lock in customers with Instacart Express, a subscription service akin to Amazon Prime. Members pay $149 a year and get free delivery on orders of more than $35. About half of Instacart orders are from Express members, who average $450 a month, Mehta says.

Despite the emphasis on belt-tightening, the Instacart chief executive officer can't help talking expansion. Mehta says the service will add at least 24 markets by the end of the year. "We want to blanket the country with Instacart." —*Ellen Huet*

The bottom line Instacart is working to increase ad revenue as it tries to prove it's the exception in a field of delivery-app failures.

Hardware

A Mouse (Maker) Roars At the Industry's Giants

▶ **Logitech is preparing to fight its way into the smart home**

▶ **The company wants to do more than "just making black plastic"**

Darrell

Since Bracken Darrell took over mouse maker **Logitech International S.A.** four years ago, the company's stock has quadrupled, thanks to robust sales of PC accessories that complement products by the likes of **Apple, Microsoft, Amazon.com**, and **Google**. As Darrell plots his next move, those heavyweights are starting to look more like rivals. His goal—tying together TVs, appliances, and voice-controlled devices for the home—is something many of the biggest tech companies are also trying to crack. Logitech wants "to be at the center of connected homes, but you've got to sleep with one eye open," says IDC analyst Jonathan Gaw, because erstwhile allies may well become foes.

Darrell says the push into smart homes won't be a dramatic change. Logitech's keyboards, wireless mice, and neighborhood-rattling speakers always fit into the larger PC market; in newer, faster-growing categories, Darrell has sought compatibility with the tech giants. Logitech's UE Boom speakers understand Apple's Siri and Google Now, its remotes use Amazon's Alexa to control everything from TVs to heating, and its accessories can turn an iPad into a mini laptop. "There's no way these big players are going to want to be in every little puddle around their operating systems," says Darrell, 55, in a Logitech office in Lausanne, Switzerland. "We've always been in categories where the big players are."

To fund his strategy, Darrell aims to wring maximum profits from mice and keyboards, which bring in sales of almost $1 billion a year at a gross margin approaching 50 percent. That will let him enter areas such as voice control, video collaboration, and augmented-reality games. Tavis McCourt, an analyst at Raymond James Financial Inc. in Nashville, praises Darrell for turning around a company that was "really struggling to define what it was." McCourt says he expects Logitech to develop keyboards for internet TVs and a device that takes voice commands for home automation, like Amazon's Echo and Google's Home.

The big hitters have a massive advantage over Logitech, which has historically been better at commercializing others' inventions than developing its own. The company, with revenue forecast to reach $2.2 billion this year, devotes less than $150 million annually to research and development. Microsoft last year spent about $12 billion; Google, $14 billion; and Amazon, $16 billion. That could make it tough for Logitech to build products sophisticated enough to command premium prices, says Torsten Sauter, head of Swiss research at broker Kepler Cheuvreux. "They have no software, no ecosystem," he says. "Logitech is much more a design company than a tech company."

Darrell joined Logitech after four years at Whirlpool Corp. and stints at General Electric Co. and Procter & Gamble Co., where he ran Braun, the German maker of high-design shavers and clocks. His predecessor at Logitech was ousted in 2011 following lower profit forecasts and a $34 million writedown for the Revue, a keyboard for Google TV. Darrell says the company had lost its focus on design and was "just making black plastic."

While revenue was largely flat in Darrell's first three years, as he cut costs and shut down or sold less-profitable businesses, retail sales this year are expected to grow at least 12 percent from 2016, excluding currency fluctuations. Profit has more than tripled during his tenure. Darrell says he can succeed by stressing design and marketing to create hits such as the UE Boom speakers, as well as novelties such as a quieter, "clickless" mouse and a wireless dock for phones that lets users toggle between typing on their PC screen and smartphone.

Darrell says projects in the works include cloud services tied to Logitech products, such as storing video from home-surveillance cameras. Spotlight, a $130 remote for presentations, is an example of the hardware and software integration and higher-quality manufacturing Logitech is shooting for. Its weighty aluminum feel and simple three-button design are reminiscent of Apple products, and it works with both Windows computers and Macs to highlight specific areas of a screen.

Logitech is also researching how gestures may replace computer mice and looking into devices to use in

self-driving cars, says Alastair Curtis, a veteran of Nokia Corp. who Darrell hired in 2013 as design chief. "When I first joined, Logitech was not in a good place," Curtis says. "I gave a brutal assessment." Now he says he's happy with the company's direction and position vis-à-vis tech's agenda-setters. "We're closer to Apple than ever before." —*Aaron Ricadela*

The bottom line Logitech has spent decades in partnership with tech giants, but its push into smart homes could put them in direct competition.

Ride Hailing

Keep Austin... Tough To Get Around?

▶ **South by Southwest tests a wave of homegrown Uber replacements**

▶ **"It wasn't the greatest page in our history"**

Austin has spent the past 10 months engaged in a grand experiment in transportation. **Uber Technologies Inc.** and **Lyft Inc.** stopped operating there in May, protesting a law that requires drivers to be fingerprinted for background checks. Since then, several ride-hailing startups have tried to replace them. Their success would show that approaches besides Uber's and Lyft's can work in a major U.S. city. The model is facing its biggest test yet.

Starting on March 10, hundreds of thousands of people descended on Austin for the annual South by Southwest festival, a nine-day event that could be accurately described as a tech conference, a music and film festival, and a huge mess. In tech circles, it's credited with propelling apps such as Twitter to prominence. This year's speakers include billionaire investor Mark Cuban, Gawker Media LLC founder Nick Denton, and Reddit Inc. co-founder Alexis Ohanian.

Seven ride-hailing companies operate in Austin, none of which have names that will sound familiar to most SXSW attendees. **RideAustin** and **Fasten** have been the early leaders. Together, Austin's licensed ride-hailing companies completed about 108,000 trips a week in January, the last month for which data are available. That's an estimated 13 percent less than what Uber and Lyft were handling before they pulled out.

SXSW's logistical challenges have strained the capacity of these startups. Fasten says demand on March 11 was 12 times that of a typical Saturday night. Drivers and passengers said that both Fasten and RideAustin were offline for an hour or two, just as partygoers were moving from one place to another on a rainy evening. Some complained of high surge prices and of being charged for cars that never arrived.

108 thousand

Licensed ride-hailing trips a week in Austin in January, an estimated 13 percent less than Uber and Lyft had handled

"It wasn't the greatest page in our history," says Fasten Chief Executive Officer Kirill Evdakov. "Hopefully we can regain the trust." He says Fasten has added server capacity and shut off nonessential parts of the app to improve service. RideAustin issued a statement apologizing to customers.

Fasten, which paid an undisclosed amount to be an official SXSW sponsor, had been hoping to attract more positive attention. The company raised $10 million in funding last year, and Evdakov says he's seeking an additional $20 million to expand beyond Austin and Boston. "Not many people know about what we do," he says.

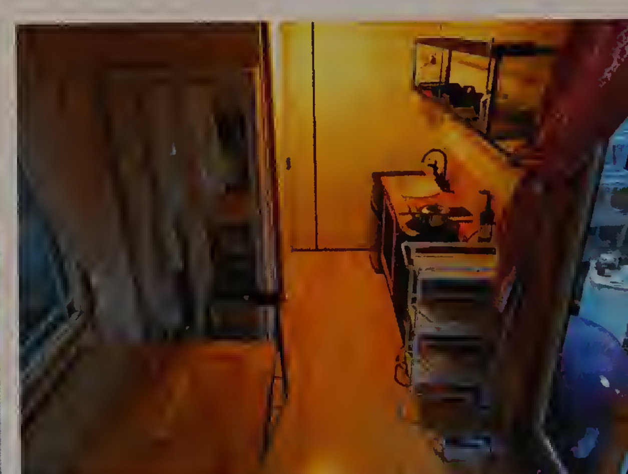
RideAustin, which is funded largely by donations from the local business community, doesn't plan to expand elsewhere. Still, it worked feverishly to mobilize drivers for the festival. ▶

Silicon Valley The Very Mobile Home

Startup Boxouse sells "portable, affordable, beautiful smart homes" made from shipping containers (the "deluxe" edition costs $49,000 and includes shipping). Chief Executive Officer Luke Iseman, a Wharton graduate who previously ran Y Combinator's hardware program, concedes that "container houses aren't perfect" but says they can help ease housing shortages. He shares one with co-founder Heather Stewart that's set up in an Oakland warehouse. They're partly financing the business by renting out two others on Airbnb. —*Max Chafkin*

Shipping container. Iseman buys them used for about $2,000 each and retrofits them with the help of a half-dozen part-time workers.

Solar panels. Boxouses are designed for off-the-grid living, with a 1.5-kilowatt solar system that heats and powers the unit and its kitchenette.



Extras. An app can control smart windows and lights, as can a complimentary Alexa. In the works: alerts to port-a-potty vendors when the wastewater tank needs emptying.

Business model. At Y Combinator's March 20-22 pitch event, Boxouse plans to announce it will ship a free container to customers who agree to run it as an Airbnb and split the income.

Innovation

WindTree

Form and function
NewWorldWind's 30-foot-tall metal structure houses 54 small turbines for localized wind-power production. The WindTree is meant to help urban businesses and governments supplement their conventional energy supplies.

Innovator Jérôme Michaud-Larivière

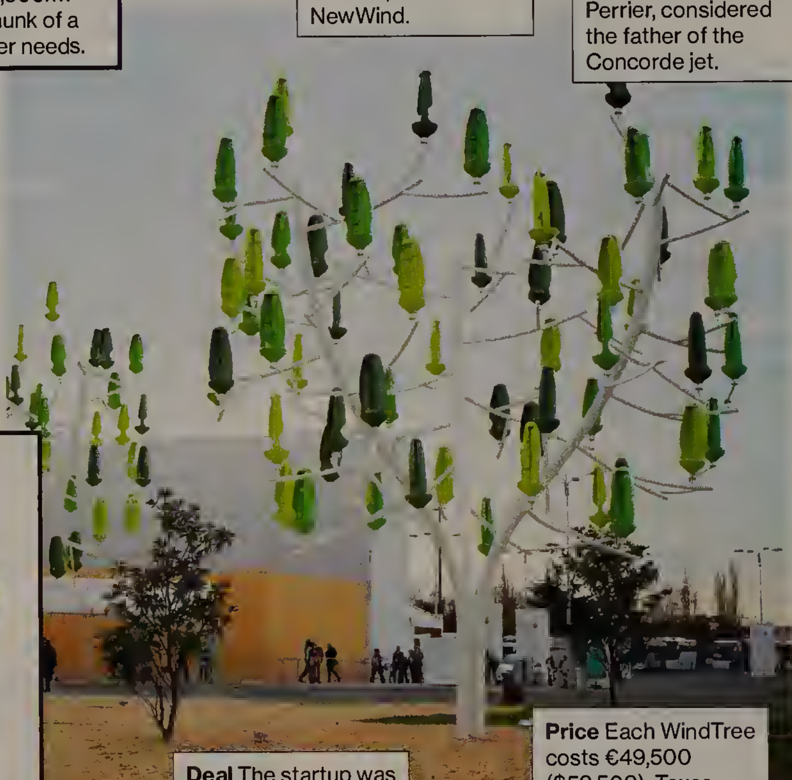
Age 58

General manager of NewWorldWind, a subsidiary of a French industrial group

Origin In 2011, shaken by the nuclear disaster in Fukushima, Japan, Michaud-Larivière, a former novelist, script doctor, and TV producer, launched a startup called NewWind.

1\. **Use** With vertical turbines working at wind speeds from roughly 4 mph to 36 mph, one WindTree can produce 1,000 kilowatts to 3,500kw a year—a decent chunk of a home's annual power needs.

Help Michaud-Larivière initially drew on the engineering expertise of his uncle, Henri Perrier, considered the father of the Concorde jet.



2\. **Tweaks** The 3-foot-long turbines, called Aeroleaves, look a bit like big ears of corn. Their microprocessors adjust turbine rotation to get the most out of the wind's kinetic energy.

Deal The startup was acquired earlier this month, hence the name change, says Michaud-Larivière. (He declined to name the acquirer pending an official announcement.)

Price Each WindTree costs €49,500 ($52,500). Taxes, shipping, and installation can bring the total to about €70,000.

Next Steps
Wind is one of the cheapest renewable energy sources, with power from new farms averaging 2¢ per kilowatt hour, according to the U.S. Department of Energy. (Obstructions from nearby buildings are likely to reduce efficiency in cities.) Seven WindTree prototypes are in use in cities and on corporate campuses in France, Germany, and Switzerland. Michaud-Larivière says his first 23 commercial trees will be delivered to customers such as Aéroports de Paris and France's Vinci Construction starting in June, and he aims to lower the price by the time North American sales begin in the fall. —*Nick Leiber*

◀ The roughly 30-employee nonprofit placed Craigslist ads in San Antonio and Houston, encouraging Uber drivers to come to town temporarily. Joe Deshotel, RideAustin's director for community engagement, says drivers from those cities periodically travel to Austin for dayslong work trips—a national trend that's raised concerns elsewhere about ride-hailing drivers' quality of life. "They're not making enough in Houston, so they're coming here," Deshotel says. "I talked to some other drivers from San Antonio who stay at friends' houses, or they just drive back."

Uber and Lyft aren't giving up on Austin. They're working with state lawmakers on a proposal that would override the city's fingerprinting rule. In 2016, Uber had 21 lobbyists registered in the state; Lyft had 13. Hearings on the first of four different state-level bills with widespread support began on March 14.

RideAustin says its funding has slowed substantially as those bills have progressed. Yet both Fasten and RideAustin say they can fend off the giants. They say they've improved life for drivers by letting them keep a larger proportion of fares; they're sharing more data with the city; and, of course, they're giving city voters what they asked for by fingerprinting drivers. In their view, the decline in overall ridership during the past year merely reflects growing pains.

Trevor Theunissen, a local spokesman for Uber, paints a different picture. He cites a recent report from a TV station highlighting a thriving illegal cab industry downtown, where drivers trawl the bar district offering rides for cash. He also says the city's ride-hailing rules are toothless because they rely on companies to self-report data.

Steve Adler, Austin's mayor, doesn't dispute this. But he says the homegrown ride-hailing industry has proved successful enough that state legislators should leave the city alone. To him, the bills are the latest pull in a long tug of war. "Austin, the rest of the state says, is weird," Adler says. "I hear that, and we're proud of that." —*Joshua Brustein*

The bottom line Austin's local ride-hailing services are better-behaved than Uber or Lyft but may soon have to face the industry giants head-on.

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Short the Food Court

▶ The struggles of retailers such as Macy's could lead to shopping center mortgage defaults

▶ "These malls are dying, and we see very limited prospect of a turnaround"

It's no secret that many shopping malls have been struggling as Americans buy more stuff online. Now some malls are catching the eye of Wall Street speculators who think they've found a way to profit from such woes.

In a strategy reminiscent of Michael Burry and Steve Eisman's famous "Big Short" wager, which made money on the collapse of the housing market before the financial crisis, a small but growing group of investment firms is betting against loans taken out by U.S. mall and shopping center operators. The loans were packaged into bonds—commercial mortgage-backed securities (CMBS)—and so far their prices haven't fallen as much as the stocks of beaten-down retailers.

The speculators think this will change. By one measure, bets against some of the most vulnerable CMBS surged to $5.3 billion last month, a jump of more than 50 percent from a year earlier. Among the firms lining up against mall debt is **Alder Hill Management**, started by protégés of hedge fund billionaire David Tepper.

The investors are buying credit protection contracts, which pay for CMBS losses that occur when shopping centers fall behind on their loans. In return, buyers pay monthly premiums to the seller—usually a bank—for as long as they hold the position. So far this year, traders bought a net $985 million of contracts that target risky portions of CMBS, according to the Depository Trust & Clearing Corp. That's more than five times the purchases in the prior three months.

Nobody is suggesting there's a bubble in retail-backed mortgages that's anywhere as big as the one in home loans in the 2000s or that the potential fallout is comparable. The bearish bets are just a tiny fraction of the $365 billion CMBS market. They're

costly to maintain and may not pay off. Many malls could limp along, earning just enough from tenants to stay current on their loans.

Still, bears are convinced that the trouble in brick-and-mortar retail will lead to a pileup of loan defaults. After a poor Christmas season, **J.C. Penney Co.** said in February that it plans to shutter as many as 140 stores out of 1,000. That echoed **Macy's Inc.**'s decision last year to close some 100 outlets and **Sears Holdings Corp.**'s move to shut about 150 locations. Delinquencies on retail loans are at 6.5 percent, a percentage point higher than those for CMBS as a whole, according to Wells Fargo & Co.

The extent of losses on mall loans has been "meaningfully higher than other areas," says Michael Yannell, head of research at Gapstow Capital Partners, which invests in hedge funds that specialize in trading complex debt-based securities. Investors are focused on bonds sold in 2012 that are backed by a lot of loans to regional malls and shopping centers. "These malls are dying, and we see very limited prospect of a turnaround in performance," said a January report from Alder Hill. "We expect 2017 to be a tipping point." And they favor the portions of CMBS rated BBB- and BB, which suffer losses first when the underlying loans default.

Prices on portions of CMBS rated BBB- slumped to 87.1¢ on the dollar in mid-March, from about 96¢ in late January, index data compiled by Markit show. Many of the malls are anchored by the same struggling chains, and a wave of closures could be "disastrous" for mortgage-backed securities, according to Alder Hill. In the worst-case scenario, the money manager says, the bonds rated BBB- could incur losses of as much as 50 percent, while the BB portion might lose 70 percent.

Some think it's the mall bond bears that are headed for a bath. Credit Suisse Group AG said last month that non-CMBS specialists are helping to drive the recent runup in demand for credit protection. That raises concern that too many people are chasing the same trade. "The short feels crowded to us," says Matthew Weinstein, principal at Axonic Capital, a hedge fund. "If these defaults start happening soon, the short will work." And if they don't? Because of the way the contracts are constructed, the first big investor to back out of the bearish trade could trigger losses for those who move more slowly.

It costs about 3 percent a year of the amount invested to short securities rated BBB- and 5 percent to bet against BB notes, plus an upfront fee to put on the trade. The wager is "more speculative" than the short on housing was, according to Sorin Capital Management's Tom Digan.

Hudson Valley Mall in Kingston, N.Y., offers a glimpse of the grim prospects for some shopping centers. It used to house a J.C. Penney and a Macy's, but both left. In January the mall was sold for less than 20 percent of its original $50 million loan. "When a mall starts to falter, the end result is typically binary in nature," says Matt Tortorello, a senior analyst at Kroll Bond Rating Agency Inc. "It's either the mall is going to survive or it's going to take a substantial loss."
—Rachel Evans and Matt Scully

The bottom line Speculators are buying contracts that will pay off when malls can't pay back their loans. But the trade has risks.

Gambling

A Wall Street Legend Flops in Sports Betting

▶ **Howard Lutnick is shopping around CG Technology**

▶ **"If I'm going to bet $50 to $100 ... I'm at least going to want a beer"**

March Madness, the biggest championship tournament in U.S. college basketball, hits Las Vegas each year like a tomahawk jam. Hundreds of millions of dollars course through the city's sports betting parlors, far exceeding the wagers placed on the one-day Super Bowl event.

Howard Lutnick has spent much of the past decade trying to get a piece of that action by building a sports gambling operation, **CG Technology LP**. But Vegas is a tough town. Even a player as skilled as Lutnick—he rebuilt the investment bank and brokerage **Cantor Fitzgerald LP** after it lost most of its New York employees in the Sept. 11 attacks—can run into obstacles. Now, he may be folding his hand.

$4.5 billion

Amount spent on sports betting in Nevada in 2016

Lutnick is shopping the business around in what is described as an informal process to gauge interest, according to a person familiar with the move. Cantor's internal mergers-and-acquisitions team is handling the possible sale. Even though CG is losing money, the person says, it may fetch $50 million.

Revenue at the company has stalled. Its chief executive officer, a longtime Lutnick confidant, left last year as part of a settlement with regulators over miscalculated bet payouts and hasn't been replaced. Another former CG executive pleaded guilty to scheming with illegal bookies; the company in October agreed to pay $16.5 million to avoid prosecution in the case. Lutnick declined to comment for this story through a spokeswoman, Karen Laureano-Rikardsen.

Lutnick bought odds-making company Las Vegas Sports Consultants Inc. in 2008, merging it with an existing company then called Cantor Gaming, and put at least $150 million into the business, according to *Bloomberg Markets* magazine in 2012. It opened its first sports betting parlor—a sportsbook in Vegas lingo—in 2009 and now has operations in eight Nevada locations, including some of the city's highest-end casino venues, such as the **Venetian Las Vegas**.

Lutnick wanted to inject a bit of Wall Street into Vegas. CG sought to distinguish itself with sophisticated software and devices that allowed gamblers to bet anywhere in the casino or hotel. Its computer servers were driven by the type ▶

Bankers Your Review Is Now. And Now. And Now

JPMorgan Chase & Co. will soon use a mobile tool to give employees instant feedback on their performance. Moments after a meeting or project is completed, a manager can ping participants for reactions on how a specific person did, according to Michael D'Ausilio, a managing director at the bank. —*Hugh Son*

◀ of software that fuels derivatives trading, spewing out odds on events at the fastest rate ever in Las Vegas, CG said. That allows gamblers to place bets during contests on dozens of situations. Competitors followed with similar mobile technology.

Another strategy adopted by the company was to offer higher betting limits than competitors. That led to CG's most serious stumble, according to federal prosecutors. Michael Colbert, the company's head of risk management, oversaw an operation that took in millions of dollars in illegal bets, including wagers from an East Coast betting outfit known as the "Jersey Boys" that operated from 2009 to 2012, Nevada regulators and the Department of Justice said. Some of the outside bets were needed to offset large ones CG was taking from gamblers on the other side, prosecutors said in 2016.

Nevada gaming regulators in 2014 hit the company with its biggest fine ever—$5.5 million—and last October it settled with U.S. authorities for an additional $22.5 million after being accused of illegal gambling and money laundering. CG admitted wrongdoing on the federal charges and some of the state allegations. Colbert, who is no longer with the company, pleaded guilty to a single charge of conspiracy in 2013. Murray Richman, an attorney for Colbert, declined to comment.

Cantor Gaming announced it was changing its name to CG Technology the same day Nevada regulators charged it with violations related to the Jersey Boys case. Lutnick and a family trust own almost all of the company, according to Nevada gaming records.

CG's problems didn't end with those legal troubles. Last May, the Nevada Gaming Control Board accused it of underpaying customers on more than 20,000 bets from 2011 to 2015. The regulators agreed to a settlement in which CEO Lee Amaitis left CG and it paid a $1.5 million fine. Amaitis didn't respond to messages left on his answering machine. While denying that CG intended to profit from the errors, the company said it had provided refunds to most of the affected gamblers.

CG remains a small and not particularly fast-growing business. It was projected to generate revenue of $33 million in 2016, according to documents filed in January in a suit against the company by a patent holder. That was up from $30.7 million three years earlier, the documents show.

CG had hoped growth would come from legal sports betting spreading across the country. In Nevada, sports gamblers bet $4.5 billion in 2016, according to the Nevada Gaming Control Board. That's a fraction of the estimated $149 billion that Americans wagered illegally on sports in 2015, according to the American Gaming Association, a casino-industry group. But efforts to legalize sports betting beyond the four states permitted by federal law—Nevada, Delaware, Montana, and Oregon—have been blocked by sports leagues that fear gambling may lead to game-fixing.

The casinos that work with CG remain committed to the company. One reason is the lucrative rents CG pays for space, according to a person familiar with the financial terms. **Red Rock Resorts Inc.** has long operated its own sports betting business but kept CG as the provider for the Palms Casino Resort after acquiring it last year.

There's one other downside for CG's operations. Because it operates the sportsbooks and not bars for its casino clients, the company rarely offers free drinks to customers, a big draw at other properties. "I'm a little old-school," says Tommy Lorenzo, creator of TheVegasParlay.com, a website devoted to the business. "If I'm going to bet $50 to $100 on a game, I'm at least going to want a beer for it." —*Brian Louis and Christopher Palmeri*

The bottom line The chief of Cantor Fitzgerald saw an opportunity in sports betting, but a Nevada company he owns became mired in legal issues.

Energy

There's Oil Up There, But Is It Worth Getting?

▶ **Getting it from Jim Musselman's rigs to the pipeline won't be easy**

▶ **"It's a lower-for-longer world, and we've got to find a way to adapt"**

On the Alaska North Slope, it's hard to tell where the world ends. In the subzero February twilight, snow and cloud stretch to every horizon in a seamless vault of spectral white. Beyond the tundra, five miles out on the frozen sea, oil workers from a tiny outfit called **Caelus Energy LLC** have welded a rig shut against polar bears. "Spooky," one of the workers says into the whiteness.

In a shallow estuary called Smith Bay, Caelus, founded by Texas oilman Jim Musselman, plans to extract as much as 6 billion barrels of crude. The nearby tundra, Caelus says, could yield 4 billion more. A lot of people in Alaska hope Musselman can make it happen.

Everyone in the state knows the fracking revolution in the Lower 48 has crushed Alaska's oil industry. Four decades after the Trans-Alaska Pipeline System went live, many Alaskans fear the best days have passed. Jobs have

vanished, and the state oil wealth fund, which issues a dividend to every resident, is paying out less. The budget in Juneau is a disaster.

"With an oil pipeline that is three-quarters empty, this is good news," Governor Bill Walker said when word came of the Smith Bay find. But the discovery also presents a monumental challenge. The closest pipeline is 125 frozen miles away. Linking up would cost about $800 million, Musselman says, and that's the cheap part. The full cost of development could run $10 billion over a decade. David Houseknecht, a senior research geologist at the U.S. Geological Survey, says the Smith Bay discovery seems to have incredible potential. Then he adds: "But it's the last one you'd want to bet your retirement money on."

Musselman, 69, dreams of turning Smith Bay into a rival to Prudhoe Bay, 150 miles to the east, where the Trans-Alaska starts its 800-mile journey south. Global oil giant **BP Plc** rules Prudhoe Bay and has 1,800 employees in Alaska. Caelus, by comparison, has 100.

But no one searches for oil in Alaska unless he's prepared to be lucky. In Musselman's Dallas office, maps of all sorts, depicting things like the Roman Empire and the Viking sea routes, dot the cherry paneling. "I've always been fascinated by the early maps, by the spirit of people that didn't know what was there and would just strike out across the ocean," he says.

Musselman made his first big oil find in 1999 off the coast of West Africa; he eventually sold his company, Triton Energy Ltd., to **Hess Corp.** for $3.2 billion. In 2007 he hit a big one again, off the coast of Ghana. **Exxon Mobil Corp.** offered Musselman $4 billion for the stake owned by another of his companies, Kosmos Energy Ltd., but Ghana blocked the buyout in a dispute over royalties. Kosmos also became embroiled in a local bribery scandal. Investigators found no wrongdoing, but Musselman was forced out, four months shy of an initial public offering. He left with shares worth tens of millions of dollars.

Then Musselman established Caelus, named for the Roman sky god. Private equity firm **Apollo Global Management** agreed to invest as much as $1 billion. "Jim's a visionary who's had rare, repeated successes in discovering billions of barrels of oil in some of the world's most challenging environments," says Greg Beard, an Apollo senior partner.

To get the Smith Bay oil over to the Trans-Alaska Pipeline, the shortest route runs through the pristine wilderness near Teshekpuk Lake, home to caribou and polar bears. One tricky alternative would be an undersea pipeline along the coastline, which is eroding because of climate change. Another would be to snake the pipeline away from the lake.

Whichever way he goes, Musselman needs money first. He says he could take Caelus public, find a merger partner, or "turn the keys over" to a bigger company. All of those would have been easier a few years ago, when oil prices were high and Alaska was handing out generous tax breaks to the industry. Walker, an independent elected in 2014, has suspended $430 million of tax breaks. For Caelus, $100 million of tax breaks have been delayed.

A Caelus development project in Harrison Bay, east of Smith Bay

Walker promises to help drillers in other ways, such as supporting expanded North Slope processing and building roads to open more of the area to development. Still, the political fight over taxes is scaring off some would-be investors in Alaskan oil just

A Caelus pipeline

as new discoveries are being made, says Paul Basinski, CEO of Houston-based **Burgundy Xploration LLC**, another explorer prospecting in the north. "Every one of them is concerned," Basinski says of investors he's approached.

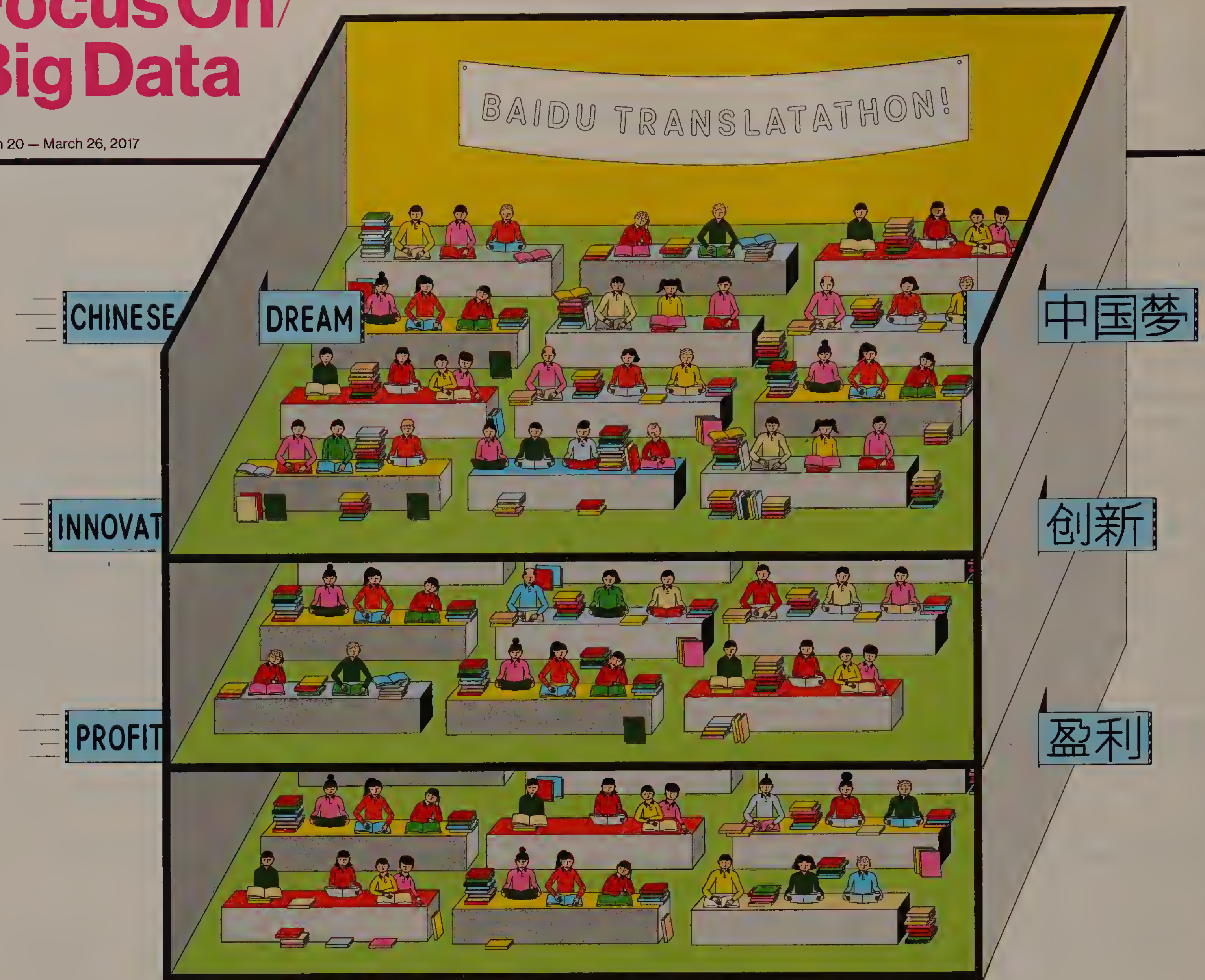
Even for behemoths Exxon, BP, and **ConocoPhillips Co.**, the North Slope's top producers, Alaskan oil is a tough call. The industry estimates that it costs almost $50 on average to produce a barrel of North Slope oil and move it to market. That's about what oil is selling for today. And with U.S. shale producers still pumping out a healthy supply, many analysts see prices staying low for years. "People are worried about the future," says Janet Weiss, president of BP's Alaska division. "It's a lower-for-longer world, and we've got to find a way to adapt to that."

Back at Smith Bay, Caelus plans to drill a test well to help determine how much oil it can pump. "I don't think I'm any smarter than a lot of people in this business," Musselman says. "I just have enough stupid confidence where I think that I can find things that no one else can." —*Alex Nussbaum*

The bottom line Alaska has been hit hard by the oil slump, and investors are cautious about putting money into new finds there.

Edited by Pat Regnier
Bloomberg.com

March 20 — March 26, 2017



AI With Chinese Characteristics

▶ **Baidu has a labor-intensive approach to deep learning**

▶ **"We literally dubbed it the Tchaikovsky Problem"**

On Dec. 6, 2016, thousands of translators filed into office buildings across mainland China to pore over brochures, letters, and technical manuals, all in foreign languages, painstakingly rendering their texts in Chinese characters. This marathon carried on for 15 hours a day for an entire month. Clients that supplied the material received professional-grade Chinese versions of the originals at a bargain price. But **Baidu Inc.**, the Beijing-based company that organized the mass translation, got something potentially more valuable: millions of English-Mandarin word pairs with which to train its online translation engine.

China is infamous for its knockoffs, whether luxury handbags or web startups. But the country's leadership seems to understand that when it comes to artificial intelligence, cheap imitations just won't do—not when its rivals include **Alphabet**, **Facebook**, **IBM**, and **Microsoft**. In February the National Development and Reform Commission appointed Baidu—often described as the Google of China—to lead a new AI lab, signaling that Beijing believes the company has the makings of a national champion in this sphere.

Of the more than 20 billion yuan ($2.9 billion) Baidu has spent on research and development over the past two and a half years, most has been on AI, according to comments cofounder and Chief Executive Officer Robin Li made at the lab's launch last month. But China's national interest isn't his main motivation: Baidu's revenue growth fell to about 6 percent

Compulsive behavior can help diabetics 40

Software to make bicycle dreams come true 41

last year, from an average of more than 30 percent over the prior three years. The search ad business, which contributed the lion's share of its 70.5 billion yuan in sales in the fiscal year ended on Dec. 31, is under siege from local rivals. A September report from EMarketer Inc. noted that **Alibaba Group Holding Ltd.** had overtaken Baidu to become the leader in China's digital ad market. Baidu hopes AI can help it reclaim share in search, as well as ensure success in newer ventures.

That's key as the 17-year-old company's attempts at diversification have produced mixed results. The number of daily visitors to its group buying site, Nuomi, dropped 59 percent in the 12 months through February 2017; its Waimai food delivery service lags in third place, according to Natalie Wu, an analyst with China International Capital Corp. The Netflix-like streaming video service iQiyi.com is hugely popular, but it will take 12 billion yuan to keep it stocked with content this year, estimates analyst Ella Ji with China Renaissance Securities (Hong Kong) Ltd.

Those faltering efforts mean Baidu's push into AI is taking on greater importance. "The era of mobile internet has ended," said Li in a March 10 interview. "We're going to aggressively invest in AI, and I think it's going to benefit a lot of people and transform industry after industry."

In January the company named former Microsoft Corp. executive Qi Lu as its chief operating officer, with a mandate to reshape the company around such technologies as deep learning, augmented reality, and image recognition. He joins Chief Scientist Andrew Ng, a Stanford academic who worked on Alphabet Inc.'s deep learning group before decamping to Baidu in 2014. Under Ng's watch, the company's AI team, which is scattered across research labs in Beijing, Shenzhen, Shanghai, and Sunnyvale, Calif., has grown to 1,300 and is expected to increase by several hundred more hires this year. "A ton of stuff is invented in China, and a ton of stuff is invented in the U.S.," says Ng, who's based in Silicon Valley. "By having people in both countries, we see the latest trends."

On the day in May 2014 that the Sunnyvale research center opened, Ng and his top lieutenant, Adam Coates, sat down in front of a blank whiteboard to identify their first project. After drawing up a list of possibilities (and challenges), they settled on speech recognition as a foundation on which they could build a series of other offerings.

By mid-2015, the 50-person team had a product called Deep Speech that could decipher much of what was said in English. Rather than picking apart phrases word by word, the software parsed through vast reams of language data and then extrapolated patterns, a process known as deep learning. The system could transcribe speech more accurately than traditional engines that rely on vocabulary lists and phonetic dictionaries, Ng says, because it took into account a word's context to determine its meaning.

One thing that consistently tripped it up, though, were words and names that had over time crept into the English lexicon from other languages. "If you want to say 'Play music by Tchaikovsky,' the software would return answers like 'Play music and try cough ski,' " says Coates, whom Ng recruited from Stanford. "We literally dubbed it the Tchaikovsky Problem."

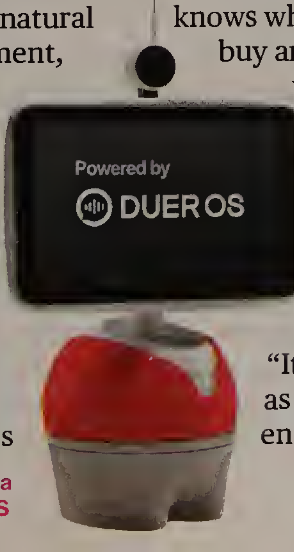
Instead of simply adding "Tchaikovsky" to the system's vocabulary list, Baidu's programmers had to help Deep Speech teach itself to understand the word. That involved pumping in even more data to help the system put things in context.

Shiqi Zhao, the Beijing-based associate director of Baidu's natural language processing department, recalls that as a computer science student at China's Harbin Institute of Technology he had only 2 million word pairs of English-to-Chinese terms to play with while working on computer-based translation; Baidu has about 100 million. However, that's still far fewer than Alphabet's 500 million, according to a 2016 article in *Science* magazine that featured one of the U.S. company's research scientists, Quoc V. Le.

To help close the gap, Baidu has resorted to an age-old tactic: throw lots of people at the problem. The company now facilitates manual translations year-round and stages marathon events such as the one in December at regular intervals, in which it offers clients prizes such as smartphones and water purifiers. The data collected help enhance the performance of its Baidu Translate engine as well as further the development of Deep Speech.

The software created by the Sunnyvale team had its commercial debut in July 2016 with the release of TalkType, a keyboard app with a talk-to-text feature. The technology has since been incorporated into other products, including a Siri-like personal assistant named DuMi in China and DuEr everywhere else. (DuMi is a fusion of "du" from Baidu and "mi," which means "secretary" in Mandarin; DuEr sounds like "doer.") The machine learning Baidu has inculcated into Deep Speech is helping it animate other products with intelligence. For instance, it's the secret sauce in Xiaoyu Zaijia ("Little Fish"), a voice-controlled robot, à la Amazon Echo, that Baidu showed off at the CES show in Las Vegas in January.

Baidu's portfolio of web properties gives it access to one of the largest and most detailed sets of consumer data ever produced in China, which—in theory at least—should give it an edge in building AI-infused products and services for the mainland. Thanks to Nuomi and Waimai, the company knows what Chinese households buy and eat, while Ctrip.com, the world's second-largest online travel agent, reveals where they want to holiday. Every month 665 million smartphone users surf its mobile portal and apps, while 341 million use Baidu Maps to reach their destination. "It's a mistake to think of AI as a product—it underpins and enables product," says HSBC ▶



Baidu showed off Little Fish, a voice-activated robot, at CES

◀ Holdings Plc analyst Chi Tsang. "Think of all the use cases."

The new AI products aren't contributing much to Baidu's bottom line yet. But the company's nascent expertise in this area could help it achieve dominance in segments where it's already present and propel it into new ones, such as cloud computing and self-driving cars. "In the next three to five years all those areas have the potential to become another Baidu," company President Zhang Ya-Qin says, referring to Baidu's $60.2 billion market capitalization. "Right now it's time to make some bets."
—*David Ramli and Alex Webb*

The bottom line Baidu's 1,300-person AI team is writing software to improve everything from translation to food ordering.

Health

For Diabetics, the Power of Knowing

▶ **A new type of glucose reader gets users addicted to data**

▶ **"It's elegant. It's small. It's unobtrusive. I wanted it"**

When **Abbott Laboratories** rolled out a device in Europe to help diabetics measure their glucose levels without having to prick a finger, it included a novel ask for patients: Would they allow the company to collect their data to help guide care? The company never imagined it would be sparking an information obsession.

More than 50,000 people who used the FreeStyle Libre from 2014 to 2016 granted the company access, yielding 409 million data points. The results provide an unparalleled glimpse into the ebb and flow of testing in a group of people whose lives—and limbs—depend on their efforts.

The Libre is a waterproof button the size of a quarter that sits on the outside of the upper arm. It houses a tiny **needle-shaped sensor** that rests just under the skin, continuously measuring glucose levels in the interstitial fluid that bathes the cells. Users hold a companion device, or an Android phone, above the sensor to get an immediate reading; an arrow indicates if levels are rising or falling. The information can be uploaded to Abbott.

The company didn't anticipate how addictive getting information would be. FreeStyle Libre users scanned their sensors an average 16 times a day; some exceeded 45. The results blew past traditional testing with blood taken from a fingertip, which for Type 1 diabetics is recommended four to eight times a day—a regimen that some find taxing.

The Abbott analysis found those who tested the most had the best glucose control. That's a key goal for treating diabetes, a chronic condition in almost 30 million Americans. It's marked by a deficiency of insulin, a hormone that converts blood glucose into energy. If glucose climbs too high, it can damage organs such as the kidneys, and also the hands and feet, leading to amputations; if it dips too low, it can cause a diabetic coma—or death.

Adrian Long, a 59-year-old semiretired teacher from Lancashire, 200 miles northwest of London, admits he let his blood sugar run a bit high for years. He wanted to avoid the complications of going too low, which even at nondeadly levels can cause shakiness, confusion, headaches, and fatigue.

Long says the FreeStyle Libre lets him "micromanage" his condition. An avid gardener, he says he measures his glucose about 20 times a day, sometimes more when he's physically active, such as when he's planting vegetables. "With the Libre, there is no limit to the number of scans you can do," says Long, who pays about £100 pounds a month ($123) for the sensor, which must be replaced every two weeks and isn't yet covered by the National Health Service. "Over the two years I've been using it, there has been a significant reduction in my A1C reading," he says, referring to a widely used glucose gauge.

Simplicity is a key feature of the device, and one of the main reasons Abbott was able to gather the data it did, says Joel Goldsmith, senior director of digital platforms for the diabetes division. The specifics for each patient, including age and gender, were removed from the files, and the medical information was aggregated before it was analyzed. "The only way you get a large volume of data is making the process effortless for the user," he says. "The act requires very little of them, and they are willing to do it frequently. It's a virtuous circle."

One of the greatest pitfalls for any monitoring device is collecting data that goes unused, says Jared Watkin, Abbott's senior vice president for diabetes care. "It's not just getting the information; you have to do something with it," he says. "That's playing out. We give data to people, and they can immediately act on it."

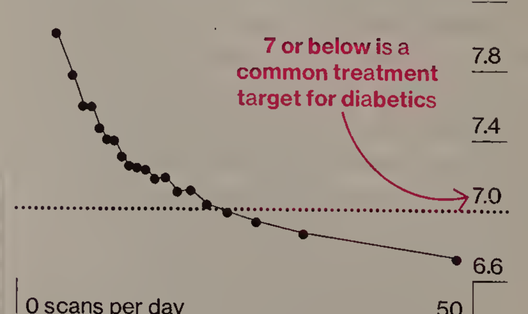
It was the FreeStyle Libre's minimalist design that first attracted Larissa Zimberoff, a 45-year-old freelance journalist who writes about food and technology. A Type 1 diabetic, she learned about the device two years ago while researching a piece for *Wired* magazine. "It's not on my stomach, it's not this pager-looking thing," she says. "It's elegant. It's small. It's unobtrusive. I wanted it."

There was a problem. Zimberoff is an American living in New York City, and the FreeStyle Libre isn't approved for use in the U.S. She started importing it from Italy, thanks to an accommodating friend. She's been paying $400 every three months for the past year for the sensors, which are expected to get U.S. Food and Drug Administration approval later this year.

The repeated checks aren't always helpful, and some users have reported ▼

More Data, More Control

FreeStyle Libre users who monitored themselves more frequently achieved lower glucose levels



*A MEASURE OF HOW MUCH HEMOGLOBIN IS COATED WITH SUGAR; DATA: ABBOTT LABORATORIES

being overwhelmed by the data. Those who log in to the system on their computers can access seven different reports on their blood sugar, tracking readings and patterns over time.

Zimberoff says diabetics need better insight into their health than a static data point created by a traditional finger stick. "The beauty of using this flash meter is that I know my trends," she says. "Diabetes isn't something you can turn off. It's not something that you cannot pay attention to." *—Michelle Cortez*

The bottom line Diabetics using a new meter took readings more frequently—about 16 times a day—and did better at lowering glucose levels.

Sports Business

Injecting Data, Not Drugs, to Win the Tour

▶ **Telefónica says deep analysis can give cyclists an edge in big races**

▶ **"In this sport, whoever has the best legs wins"**

Quintana

The Spanish city of Granada lies more than 1,000 miles from Paris and Milan, but for Nairo Quintana, the road to both could well pass through a small computer lab on the outskirts of town. The 12-year-old facility is where phone company **Telefónica SA** is analyzing hundreds of millions of data samples with an eye toward helping the Colombian rider win cycling's two biggest races in a single season.

Coming out on top in the same year in the Giro d'Italia, which ends in Milan on May 28, and the Tour de France, which wraps up with a 65-mile ride to the Champs Elysée on July 23, is notoriously difficult, because cyclists must reach peak performance twice in three months. Only a half-dozen riders have done so, and none in the past two decades. Quintana, 27, has never finished the Tour in the yellow jersey of the leader, but he won the Giro in 2014 and, two years later, the No. 3 event on the calendar, Spain's Vuelta a España.

Telefónica, a Madrid-based company that sponsors Quintana's team under the name of its retail unit, Movistar, says the challenge can be met by better understanding the flood of information teams gather on riders during training and throughout the grueling three-week competitions known as the grand tours. The data can help coaches more accurately assess the impact of exercise, diet, and climate, much like the Oakland Athletics did in 2002 (as chronicled in the 2011 movie *Moneyball*), according to Pedro de Alarcón, one of two Telefónica employees working on the project. "The trainer can see after the race if the rider followed instructions," de Alarcón says. "Whether he held back, sped up, how tired he was." Ultimately the software might allow coaches to alter their strategy in real time during competitions, much as the Williams team does in Formula One auto racing, he says. "Currently, the coach simply asks the racer how he feels and how he did, and the rider gives his impressions."

The data push is being led by Luca, a Telefónica unit that helps companies find ways to profit from data they collect in the normal course of business. Telefónica's chief data officer, Chema Alonso, a big cycling fan, and members of Luca decided to try using data to give the team an edge—and give Movistar a publicity boost by highlighting its doping-free reputation in a sport tarnished by the cheating of Lance Armstrong and dozens of others.

It's not easy to bring everyone around to the idea that data can make a difference. Eusebio Unzué, the team's manager for 32 years, says he's better off following his gut when it comes to advising his riders, a strategy that's helped him build Movistar into the world's top-ranked team for the last four years. "In this sport, whoever has the best legs wins the race," he says. De Alarcón says Unzué's resistance is similar to what he encounters at companies where veteran managers trust their instincts more than technology, but he predicts even old-timers such as Unzué will eventually conclude that it's never bad to have more information even if you rely on years of experience. Unzué grudgingly agrees. "Technology is more and more important and improving in certain aspects of preparation," he says.

Telefónica started studying Quintana and seven other top Movistar riders last season and this year expanded the system to include all 28 members of the team, using data collected by heart monitors, GPS location trackers, and a host of other devices. Mikel Zabala, a Movistar coach and professor of sports science at the University of Granada, began analyzing rider data in 2013 using a pair of off-the-shelf programs aimed at shaping the training regimens of endurance athletes such as cyclists and marathoners. He complemented them with Excel spreadsheets, in which he did complex calculations to track racers' performance and the level of physical stress they face while riding. When the Luca researchers signed on, Zabala asked them for software to analyze a rider's energy output and reactions to different terrain, which had been impossible in his spreadsheets given the number of variables and the difficulty of the math. The new data "helps you know you are going in the right direction," Zabala says.

Even if Quintana, ranked No. 4 in the world, manages to win both races this summer, data collection will play only a tangential role. The team used the software last September in the Vuelta, but the coaches haven't fully developed it for preseason training. They say the system might be ready for the Tour but not the Giro, which starts in less than two months. When it is, Zabala predicts, the software could help Quintana and his team top the podium in both races. "With the tools Telefónica is offering us, we can do deeper analysis," Zabala says. "We are learning and confirming a lot of things." *—Rodrigo Orihuela*

The bottom line The Movistar team is testing data-crunching software that it says could help its riders win cycling's most prestigious races.

Edited by Cristina Lindblad and David Rocks
Bloomberg.com


Frances P.
Jersey City, N.J.
2015

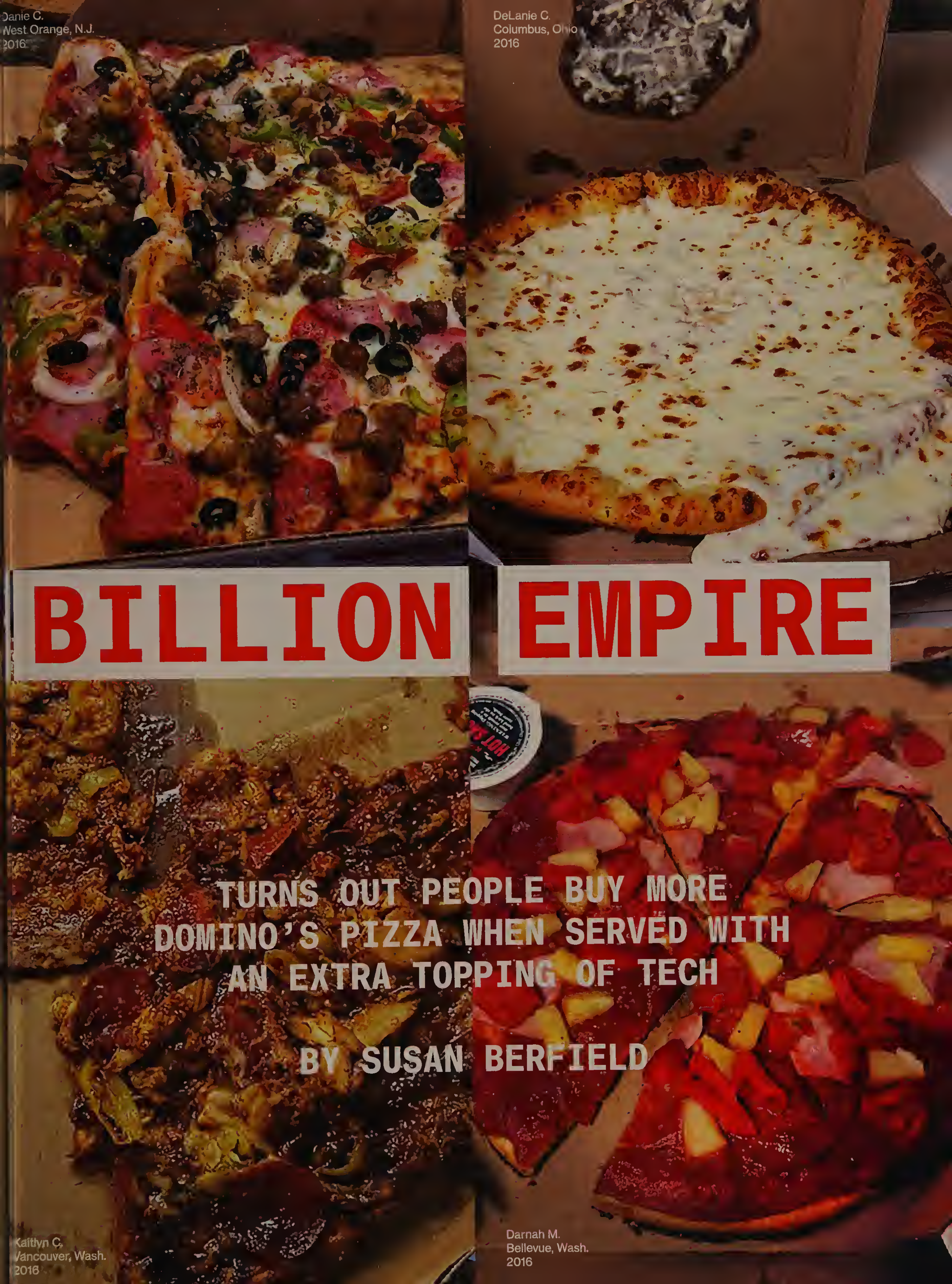

Bianca T.
Boston
2014

DELIVERING A $9


Customer photos from Yelp

Steve S.
Allston, Mass.
2017


Marco V.
Maple Shade, N.J.
2016



Danie C.
West Orange, N.J.
2016

DeLanie C.
Columbus, Ohio
2016

BILLION EMPIRE

TURNS OUT PEOPLE BUY MORE DOMINO'S PIZZA WHEN SERVED WITH AN EXTRA TOPPING OF TECH

BY SUSAN BERFIELD

Kaitlyn C.
Vancouver, Wash.
2016

Darnah M.
Bellevue, Wash.
2016

You may not be surprised to learn that pizza production at Domino's hasn't changed much in the 57 years since the company was founded. It's still essentially hands on the dough and in the cheese. There's been only one important advance: the spoodle, a ladle with a flat bottom that allows workers to spread the sauce evenly and quickly. A franchisee came up with the idea in 1985, and it's become a restaurant industry essential.

But whereas pizzamaking remains high-touch and traditional, pizza marketing is anything but. There, Domino's Pizza Inc. has decided that modern works better than authentic, and fun is best of all. For the past five years, the company has been emphasizing all the ways you can order pizza with minimal human and maximal digital contact. It's introduced more ordering methods—Facebook, Twitter, Twitter with emojis, Apple Watch, voice-activated, "zero click," wedding registry—than new items on its menu. Customers can track their pizzas online, starting as they're being made, and in San Diego (for now; likely nationwide soon) they can track their drivers. If an Australian wants to pick up her order, a GPS system can monitor her approach so the pizza is hot on arrival.

Domino's has spent millions to trick out a fleet featuring "the ultimate pizza delivery vehicle"—the DXP, a Chevrolet Spark subcompact with special side doors and warming ovens. An independent franchisee in New Zealand is testing delivery by drone and robot. In 2015, for the first time, more than half of Domino's orders were placed online, and half of those came via mobile.

As the company has built up its tech cred, its financial fortunes have been rising. Since the end of 2008, when Domino's was threatened by declining sales and distressed franchisees, its share price has increased 60-fold. The company is now worth $9 billion. The second-biggest U.S. chain has also been stealing customers from rivals, notably from the biggest, Pizza Hut Inc. Domino's went from having a 9 percent share of the pizza restaurant market in 2009 to 15 percent in 2016, according to research firm NPD Crest. Sales at established locations in the U.S. increased every year during that time, last year rising 10.5 percent, the fastest growth rate among the top 10 quick-service chains. Customer loyalty is also the highest among pizza chains, according to consultancy Brand Keys. Domino's makes money from the royalties paid by its franchisees, who own about 97 percent of the restaurants, and from the ingredients it sells them. In 2016 global sales for the chain, including franchisees, were $10.9 billion; revenue for Domino's itself was $2.5 billion.

Given how the company's technological prowess and financial fortunes have improved in step, you could be fooled into believing the former is entirely responsible for the latter. But the truth is, most customers don't use a voice-activated app or emojis to order pizza, and most pizza is still delivered by humans in cars or on scooters or bikes. And although Domino's offers 27 toppings and sauces, most people still order just pepperoni. As much as tech, what buoyed Domino's was a once-in-an-industry strategy: In 2009 it admitted that its foundational product was...bad. Most chains that encounter trouble cop to some failing: Starbucks Corp. once said it built too many stores. McDonald's Corp. tried to sell healthier food. Chipotle Mexican Grill Inc. promised patrons they wouldn't get sick. But Domino's has outdone them all.

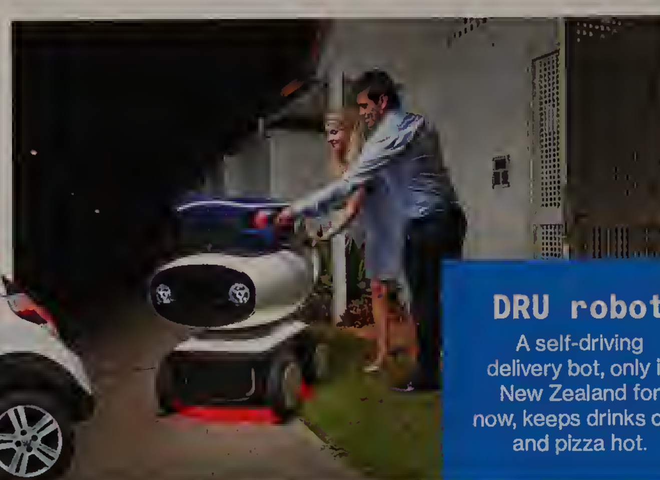
A white picket fence marks the boundary of Domino's Farms, a 270-acre spread of pastoral land outside Ann Arbor, Mich., where 800 employees and a small herd of buffalo roam. The employees work in a series of almost half-mile-long, three-story red-brick buildings with blue copper tile roofs, designed in the Prairie style of Frank Lloyd Wright. The buffalo wander free.

The campus is the idiosyncratic vision of Domino's founder, Thomas Monaghan, and an inadvertent tribute to the marketing power of verisimilitude. In 1960, Monaghan began delivering pizza to college students in hopes of earning enough to attend himself. He did earn enough, but by then he'd lost interest. By 1985, Domino's was the fastest-growing pizza company in the U.S., with more than 2,800 restaurants, and it had expanded into four countries. (It now has 5,371 U.S. outlets and 8,440 more in 85 other countries.) Domino's 30-minutes-or-free guarantee set the cultural expectation of convenience and the standard for speed. In Neal Stephenson's 1992 techno-dystopian best-seller, *Snow Crash*, when the protagonist said of America, "There's only four things we do better than anyone else: music, movies, microcode (software), high-speed pizza delivery," readers knew who he was talking about.

Monaghan, who was raised in a Catholic orphanage, enjoyed a midlife conversion to materialism. Among his purchases were the Detroit Tigers, more than 200 classic cars, and a resort on a Lake Huron island. When he tired of his possessions, Domino's included, he sold them and set out to create a Catholic community in Florida named Ave Maria. Bain Capital LP, then run by Mitt Romney, paid him more than $1 billion for 93 percent of the pizza chain in 1998.

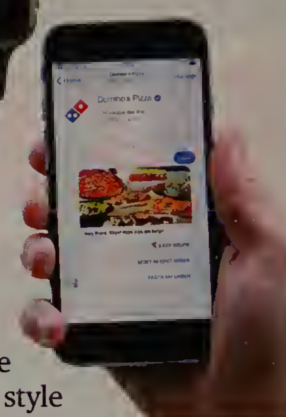
Bain brought in David Brandon, an executive with sales and

DXP fleet
Domino's has 154 modified Chevy Sparks on the road in the U.S. Each includes a warming oven with space for 80 pizzas.



DRU robot
A self-driving delivery bot, only in New Zealand for now, keeps drinks cold and pizza hot.

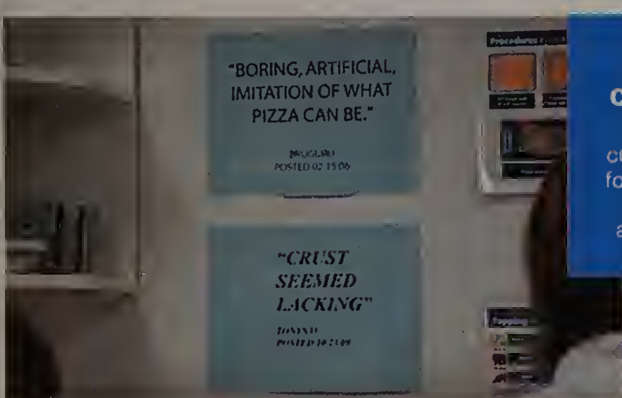
Online ordering
The chain offers more than a dozen ways to place an order without human contact.



"WE HAD SOMEHOW CREATED A SITUATION WHERE PEOPLE LIKED OUR PIZZA LESS IF THEY KNEW IT WAS FROM US. SO YEAH, THAT WAS A PROBLEM"

marketing experience, to run Domino's, and in 2004 it went public. Two years later the company reported its first full-year sales declines in the U.S. Domino's went down before the economy did, and it stayed there awhile. The pizza remained cheap, but the recipes and ingredients hadn't kept up with the foodie movement. And the company had abandoned a key marketing tool–its 30-minute guarantee–in the wake of several accidents, one fatal, which had led to two lawsuit verdicts that cost the company millions of dollars.

Then, in the spring of 2009, came the moment dreaded by every fast-food chain of the YouTube era: a video of workers doing something gross or illegal. Or in this case, both: A Domino's employee at a store in North Carolina filmed another putting cheese up his nose and adding snot to a sandwich. The video went viral, leading the health department to shut down the restaurant temporarily. Domino's had the two employees arrested for tampering with food (the orders



Apology commercial
A corporate mea culpa addressed the foundational product of the company—and helped save it.

never left the store and both workers received probation). J. Patrick Doyle, the president of U.S. operations, recorded a two-minute apology. That video didn't go viral.

At Domino's Farms, executives had already admitted to themselves a more persistent long-term threat: The pizza wasn't very good. "When we did consumer tests, if they knew the pizza was Domino's, they actually liked it less than if they just thought it was a random unbranded pizza," Doyle says. "We had somehow created a situation where people liked our pizza less if they knew it was from us. So yeah, that was a problem." Some of the more memorable comments: "The crust tastes like cardboard. The sauce tastes like ketchup." And: "This is an imitation of pizza."

So company chefs began experimenting. They enhanced the quality of the mozzarella and the flour, added garlic butter to the crust, and infused the marinara with flavor and sweetness. Some 18 months later, Domino's had a new and improved (and more expensive to make) pizza.

Doyle–53 years old, tall and fit, with a full head of hair and groomed for the job of chief executive officer–went back on air, this time as part of an ad campaign. "We decided we were really going to roll around in it," he says. "We're going to make sure people understand that we heard them, we get it. The pizza wasn't good enough." He'd taken over from Brandon in the midst of the relaunch, making the planned transition seem like a game of hot potato. "I used to joke that if it didn't work, I would probably be the shortest-tenured CEO in the history of American business," he says. When the spots appeared, starting in late December 2009, they were funny and Stephen Colbert-like in their knowing irony: apologies wrapped in self-deprecation, explaining everything except why it had taken so long for executives to take the problem seriously in the first place.

This is the part of the comeback story that Doyle and the four other Domino's executives I spoke with love to tell: Within a week or so, morning talk show hosts were discussing the campaign, local television anchors were conducting taste tests, and Gayle King was taking calls on her radio show from satisfied customers. Then came delicious, double-edged praise

Food-styling commercial
After showing how fake pizza is in most ads, Domino's promised to use only pies made by employees.

from Colbert himself: He bit into a slice on air and said, "Is that pizza, or did an angel just give birth in my mouth?"

By February, Domino's was selling so much pizza it was three days away from running out of pepperoni. Same-store sales rose more than 14 percent in the first three months of 2010–and the number would have been higher had restaurants been equipped to handle the rush. Most orders still came in by phone, so when workers were slammed, they just didn't pick up. Over the next two years, Domino's revamped about 85 percent of its menu: The chicken wings became tastier, the cheesy bread got cheesier, and "artisan" pizzas were added (and dropped after they didn't catch on).

Russell Weiner, who'd come from PepsiCo Inc. in 2008 to be Domino's chief marketing officer and is now president of U.S. operations, picks up the story from there. Wiry from losing 50 pounds on the Pritikin diet, he talks fast and keeps a giant bowl of clementines in his office. Flush with success from their first honesty offensive, Weiner and his team started discussing fresh ways for Domino's to ridicule itself. "We asked: 'What else in our industry isn't transparent?'" he says. One obvious answer: the photos used for menus and marketing. "During the shoots, they put extra melted cheese in the cracks after cutting the pizza and blow it dry," he says. "We call it cheese porn." The company's next TV spot showed what really happens on a photo shoot, along with Domino's promise, henceforth, to

use only photos of pizza that its employees had actually made.

As part of the campaign, Domino's solicited photos from its customers. The company received almost 40,000, some lovely and appetizing, others a hot mess. "We deliver a million pizzas a day, so there's always going to be some problems," Weiner says. At a franchisee meeting, Doyle showed a photo of a particularly mangled pizza that had been delivered to a guy in Minnesota named Bryce. Executives in attendance from Domino's ad agency, Crispin Porter + Bogusky LLC, had found their next ad.

Then came the digital ordering and tricked-out DXP (Delivery Experts) cars. As the initiatives proceeded, Weiner realized that Domino's didn't need new food to entice customers, as most chains do. It could advertise products that were mostly virtual or unconsumable. "We've launched very few new items in the past year," he says. Just two, in fact: salads and cookie brownies, and only the salads were featured in an ad campaign. "We put the car on TV instead," he says. "We ran a spot for four months for a car that 90 percent of the country won't see," he says, referring to the limited number, 154, that are on the road. "The cars don't need to be everywhere. Customers give us credit for trying."

Reindeer delivery in Japan

A brief experiment ended as you would expect.

"We kind of like it when we don't get something right," says Kelly Garcia, who's in charge of e-commerce at Domino's. "We went out with our voice-ordering system, Dom, in beta." That was in June 2014, when Dom would have been the first such assistant capable of helping with a purchase. A CNBC reporter tested the beta on air, on the floor of the New York Stock Exchange, but it didn't work because of the surrounding noise. "That was one of our most public learnings," Garcia says. Across the table from him in a conference room at Domino's Farms is Dennis Maloney, the company's chief digital officer. "With voice, it was 50-50 that we could even get it working," he says.

Maloney and Garcia oversee parts of a tech team that numbers about 400, the biggest division at headquarters. When I meet them in mid-January, they've just returned from CES, the electronics show in Las Vegas. They seem giddy with the commercial possibilities of artificial intelligence. Maloney recounts with delight standing in his living room recently and ordering pizza with Alexa, Amazon.com Inc.'s voice-controlled loudspeaker-computer gadget. "I'm still enamored," he says. "But it's not for everybody." (Domino's also lets customers buy pizza from Google Home, the main competitor to Alexa, but that's not for everybody, either.) At some point, Maloney and Garcia say, customers should be able to give their order to a device as normally as they would to a person, with all the pauses, ums, contractions, and accents. "We're working really hard to re-create the original experience," Maloney says. Or, as Jimmy Fallon joked in a bit about the voice-activated app: "You speak your order into the phone, or, as that's called now, ordering a pizza!"

"We're coming full circle," Garcia says. "We want it to be as if you were there—without having to be there." Domino's has always understood the importance of not having to go anywhere. Although you can still walk into a restaurant if you must, there are at least a dozen ways to order a Domino's pizza in absentia. Some are self-explanatory: mobile apps, Apple Watch, Facebook Messenger. Others need some explanation. To order via Twitter, you must create an online account, save a pizza as your favorite (known as your Easy Order), and connect it to your Twitter account. Then tweet a pizza emoji to @dominos. "We'll know who you are, what pizza you want, your default location and payment," Maloney says. "We send a 'Sounds awesome, are you sure?' You send a thumbs up." But if you want to order something other than your favorite, you're out of luck.

Hatsune Miku augmented-reality app

Ever try *Pokémon GO?* This was sort of like that, but in Japan only and with pizza.

Maloney clears away the remains of our lunch (Pacific Veggie, thin crust) to show me option 12 on his phone: zero-click ordering. "This will freak you out," he says. "What's the easiest way to order? When you don't have to do anything." One day Maloney and Garcia were in the car with their ad guys, dreaming of how to one-up Amazon's one-click ordering. Three months later they had their zero-click app, which does require one click to start. "Tap the Domino's icon to open it and find my Easy Order," Maloney says. That's it. "I have 10 seconds before it automatically places the order." A big countdown clock appears on Maloney's screen. If he does nothing, his Easy Order, a 12-inch hand-tossed pizza, will be on its way to his home.

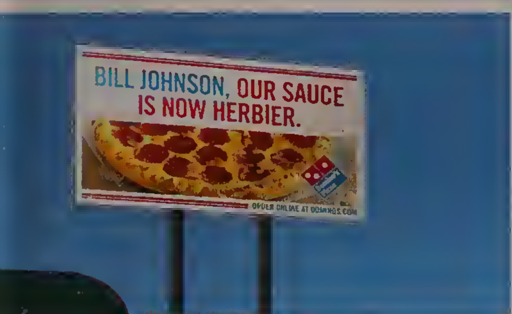
"WE WANT IT TO BE AS IF YOU WERE THERE—WITHOUT HAVING TO BE THERE," GARCIA SAYS. DOMINO'S HAS ALWAYS UNDERSTOOD THE IMPORTANCE OF NOT HAVING TO GO ANYWHERE

My *Bloomberg Businessweek* colleagues and I tried out Domino's various ordering methods. The smartphone and Apple Watch apps were easy. Facebook Messenger and Twitter required first placing an Easy Order with the basic app, which took a few minutes to figure out. Our zero-click tester didn't know where to find the app, but that could have been just him. As for Dom, that app had a hard time understanding that I wanted two large veggie pizzas, even though the newsroom

wasn't very loud. Ordering the old-fashioned way—by phone—still works well.

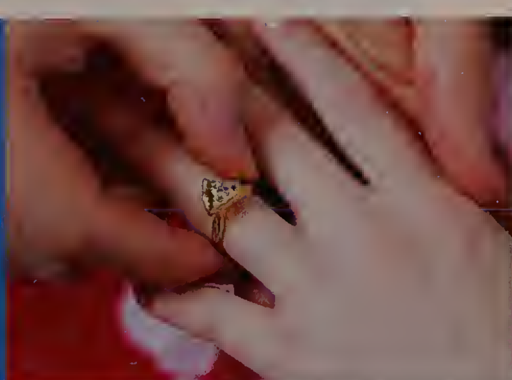
Maloney and Garcia are more careful when talking about the flip side of pizza ordering: delivery. It's a sensitive topic. Of the 260,000 people working in the Domino's system globally, more than half are drivers. Technological advances have improved the accuracy of the orders and increased business, but they haven't diminished the need for drivers—yet. A Domino's "master franchisee" in Australia that owns some 2,000 restaurants around the world is using drones to deliver pizza from a store in the New Zealand town of Whangaparaoa. They can travel about a mile from the store, and the customers need a backyard so they can land safely. When I ask about testing drone delivery in the U.S., Garcia replies, "There's a lot of regulations. But never say never." Last June the Federal Aviation Administration said drones have to remain within the operator's line of sight at all times, dashing hopes for the time being of a drone fleet landing on far-off lawns and sidewalks.

Maloney is just as guarded about the potential for Domino's robots developed in Australia and tested in New Zealand. Local reports describe difficulties navigating



Extremely niche marketing
Publicity stunt. Domino's targeted "pizza holdouts" who hadn't tried the new pizza; it jokingly created ads aimed solely at them.

Pizza engagement ring
Designed for Valentine's Day, a 22-karat gold ring with pepperoni-shaped diamonds is given to one randomly selected customer in the U.K.



uneven sidewalks (robots aren't allowed on roads). "It's a great start," Maloney says. "It was great for the brand globally." So are robots coming to America soon? "I'm not saying yes or no."

"But there won't be any reindeer," says Jenny Fouracre-Petko, the public-relations executive who's having lunch with us. She's referring to a delivery-experiment-slash-stunt conducted by a master franchisee in Japan this past winter. It ended predictably: The reindeer balked, the pizzas were crushed, and animal-rights activists complained.

"We're not copying Japan on the reindeer," Garcia says. "We're all agreed on that."

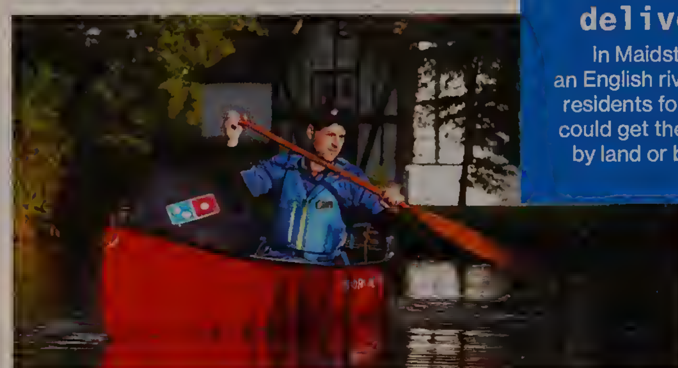
"That was crazy," Fouracre-Petko says. (No one in Japan answered an email request for comment.)

The company also won't be expanding its DXP fleet. Since Domino's originally built the vehicles, spending five years and millions of dollars to get them on the road, Chevy has lengthened the wheelbase and lowered the roof of the Spark, which means Domino's would have to re-adapt its original modifications. Executives decided 154 of them was enough for now, in part because autonomous vehicles are coming. "It's not if, it's when," Garcia says. "We're thinking about the disruption of a nearly 60-year-old business model." If another company were to get out ahead of Domino's by providing quick, reliable delivery without having to manage a staff of drivers and coordinate routes, Domino's would lose some of its competitive advantage. "We're delivery experts," Maloney says. "If everyone becomes an expert, we'd have to figure out other ways to differentiate ourselves."

Other on-demand delivery services pose a threat, too. "When you look at UberEATS or GrubHub, pizza has the most to lose," says Darren Tristano, president of research firm Technomic Inc. "If you can order pizza and wings and burgers and salads, then people who are looking for better quality and don't mind paying more will use those services. Delivery straight from a restaurant will be for the lower- and middle-income customers."

Domino's figured out mobile ordering before Starbucks and delivery before McDonald's. So it seems fair to ask, with the company faring so well: Isn't this the part where complacency sets in and some avoidable decline begins? Maybe it starts where Domino's began, with high-speed delivery. Technology helped save the company, and it's possible technology may one day undercut it.

In late February, I visited a new Domino's in the Bronx, designed so

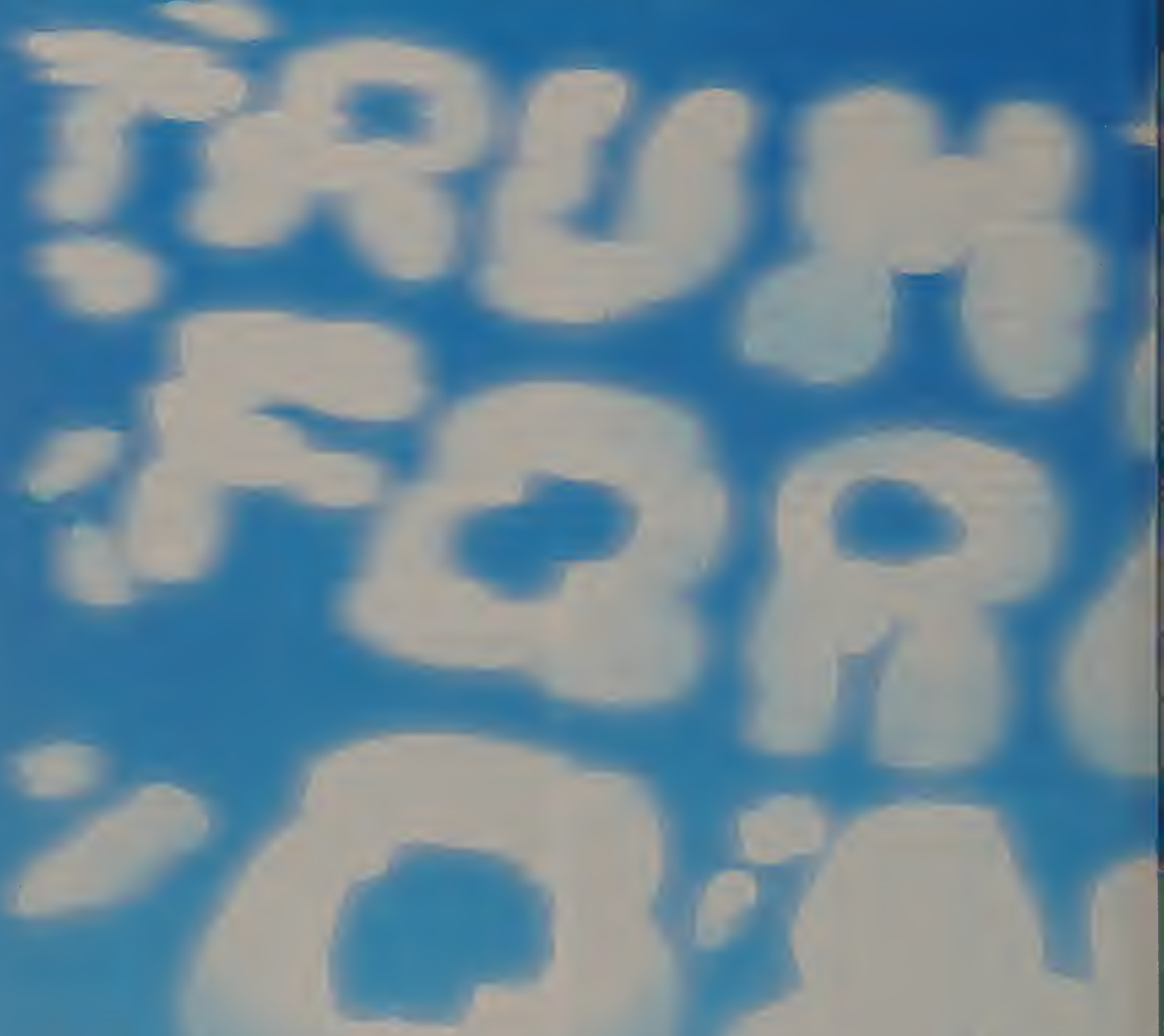


Canoe delivery
In Maidstone, an English river town, residents for a time could get their pizza by land or by sea.

customers can see their pizza being made, then eat it in a clean, bright seating area. It's a marked contrast from the company's traditional restaurants—dim, inhospitable places where customers came and left quickly. "Now we care about ambience," says Bob Machin, the head of corporate operations in New York and a former driver who can make a large pepperoni pizza in 45 seconds. Employees are expected to make one in less than a minute.

In the Bronx, you can see the company's classic technique at work, so straightforward you could almost try it at home. No need for plastic gloves, since everything is cooked at a high temperature—workers touch the food with their bare hands. Start with a mound of dough. Cross your index and third fingers to "dock" the pizza, stretching the dough from the center to create a circle that seems almost the size of a large pizza. Adjust. Spread the tomato sauce, preferably with a spoodle, and sprinkle two handfuls of cheese from higher than you think wise. "Make it rain," Machin says. Then evenly place 40 pepperoni slices around the pizza so they're next to each other but not overlapping. You'll have to learn to eyeball it; counting slows down the pace.

By the end of the year, almost all Domino's will be more open and welcoming, and the carryout business, if all goes according to plan, will increase. The human touch might be worth something, after all. When I ask Machin about all the nifty ways customers can order pizza, he smiles, acknowledging that in the kitchen, the bells and whistles don't affect the product. "On the screen," he says, "all the workers see is that an order came in on the internet." Ⓑ



After an orgy of spending and years of delay, the president's helicopter and jet are getting cost-efficient upgrades—unless the passenger-in-chief interferes

By Garrett M. Graff

Donald Trump has long had a thing about Air Force One. He denigrated the presidential jet on the campaign trail, calling it "a step down ... in every way" from his own plane, a gilded Boeing 757. He mocked Air Force One's fuel-guzzling engines and blasted President Obama for taking it to campaign rallies and on vacation. Then, one Tuesday in December, after Trump won the presidency but before he had a chance to ride on the aircraft, he picked up his Android phone and tweeted about a nascent project to replace the presidential jet with an even more powerful and capable craft. "Costs are out of control, more than $4 billion," he wrote at 8:52 a.m. "Cancel order!"

At Boeing Co.'s offices in Washington, D.C., executives hastily canceled their routine morning strategy meeting. The Air Force One project, known blandly as the Presidential Aircraft Recapitalization program, hadn't been the topic of any recent news coverage, but within minutes it was leading every cable news channel. When the stock market opened, Boeing shares dipped a little more than 1 percent.

Trump's criticisms were a bit off. For one thing, Air Force One is larger and faster, and equipped with incomparably more sophisticated technology, than Trump's 757, which he bought used. (One previous owner: a budget Mexican airline.) And nobody involved in the program knew what "more than $4 billion" referred to. Boeing executives noted that the only public expenditure so far was a $172 million contract to study the new machine's capabilities. Although building a new Air Force One has undeniable publicity value for the company, in monetary terms it barely registers at a company with $95 billion in annual revenue. Executives grumble privately that Boeing actually lost money the last time it delivered new presidential planes. But the company has larger business opportunities that could wither if relations with the president go bad. It's hoping to gain the administration's permission for a $16 billion deal to build airplanes for Iran, a contract made possible by the nuclear deal Trump has savaged.

After the tweet, Chief Executive Officer Dennis Muilenburg made pilgrimages to various Trump properties to meet with the president-elect and hear his concerns. Eventually he announced vague plans to reduce the plane's cost, while heaping praise on Trump's business acumen.

That was enough for Trump to declare mission accomplished. By February he was relying on Air Force One for regular trips to Mar-a-Lago and using it as the backdrop for a visit to Boeing's South Carolina facility. "That plane, as beautiful as it looks, is 30 years old," he said, gesturing proudly. "What can look so beautiful at 30?!" At a rally in Melbourne, Fla., he boasted about renegotiating with Boeing. "They were close to signing a $4.2 billion deal to have a new Air Force One," Trump said. "Can you believe this? I said, 'No way.' I said, 'I refuse to fly in a $4.2 billion airplane. I refuse.'" He added, "We got that price down by over $1 billion, and I probably haven't spoken, to be honest with you, for more than an hour on the project." Four days later, a U.S. Air Force spokesman said he had no idea what billion-dollar savings Trump was referring to. "To my knowledge I have not been told that we have that information," Colonel Patrick Ryder told reporters. "I refer you to the White House."

Presidential aircraft procurement represents something like peak Washington entanglement, encompassing the military-industrial complex, American vanity, internecine Pentagon politics, the Great Recession, and the Global War on Terrorism—all bound by Newton's laws of motion. Obama, too, made a high-profile attempt to scale back expenditures at the outset of his administration. In his case, the aircraft in question were the Marine One helicopters—and his efforts turned into a cautionary lesson on the hazards of trying to reboot a government procurement program mid-project. Today, almost two decades after the first efforts to upgrade Marine One and Air Force One began, both are at least momentarily ready for takeoff. There's no telling yet whether the new president, who has a keen interest in aviation, will let the programs proceed or send them back to the gate.

What all parties seem to agree on is that the president needs new equipment. The two 747-200s that serve as Air Force One (the call sign applies to any airplane carrying the commander-in-chief) will reach the end of their intended 30-year life spans this year, having first taken to the air in 1987, with interiors designed by First Lady Nancy Reagan. The oldest Marine One helicopters are a generation older. Certain components have been upgraded over the years, but the airframe remains effectively as it was in 1974, when President Richard Nixon waved goodbye from the helicopter's steps. It's scheduled to carry Trump for most of the next four years. "There are serious safety issues with the current fleet, but they're having to live with it," says John Young, who was a senior Pentagon official during the course of the Marine One project. Some of the aircraft will be 50 years old by the time they're retired.

Presidents weren't even allowed in helicopters until 1956. After a Camp David evacuation drill, during which President Dwight Eisenhower's limousine got stuck behind a truck on a winding road, the Secret Service relented on its long-standing safety objection to single-engine helicopters. The next year the Air Force procured two small, bubble-nosed Bells, similar to those seen in the opening sequence of *M*A*S*H*. Eisenhower took precisely one flight. It was another evacuation drill, this time in July, and he baked as the cramped cockpit's canopy absorbed the full power of the Washington sun. When it came time that fall to take another helicopter, Eisenhower asked for a large Marine transport aircraft—and the tradition of the Marines flying the commander-in-chief was born. One of the first things they did was install an air conditioner.

Today the presidential helicopter squadron, known as HMX-1, contains 23 primary aircraft. There are 11 distinctively brawny Sea Kings, which have been in operation since 1974; eight more streamlined White Hawks, which date to 1989; four other helicopters reserved for testing and training; and a number of Super Stallions and Sea Knights that White House personnel use. The U.S. is the only country that provides its chief executive with helicopters around the world. That is, when heads of state of other countries go abroad and need a vertical lift, they often rely on the hosts' equipment. When the U.S. president goes overseas, he brings his own helicopters—often in flights of three, to serve as backups, fly staff, and function as decoys for would-be assassins.

The helicopters complement a presidential airplane fleet that includes Air Force One; cargo aircraft that move people, motorcade vehicles, and the helicopters; smaller Gulfstream jets that carry the president on special missions; and older 757s that usually fly the vice president. The combined fleet ensures that the president can go anywhere he

wants, at any time, with perfect connectivity, so he can order a nuclear retaliatory strike at a moment's notice. And after that happens, the military has access to yet more specialized planes: Four hardened "Doomsday" 747s, whose crews refer to them as "Air Force One When It Counts," sit ready at Offutt Air Force Base in Nebraska.

Disaster figures largely in presidential aviation planning. On Sept. 11, aboard Air Force One, President George W. Bush was repeatedly frustrated by antiquated communications systems. At times he was less informed than the average CNN viewer, as the plane then had no access to satellite TV. Afterward, his administration undertook a wide-ranging effort to upgrade the president's in-flight capabilities.

Marine One helicopters got new communications and security components—"boxes," in aviation-speak—but their added weight cut the aircraft's range and number of passengers. In 2002 the Navy, which oversees Marine aviation programs, began a formal effort to develop an all-new Marine One. The White House considered various alternatives—including whether the White Hawk could succeed the Sea King as the Marine One flagship, a natural enough choice because White Hawks already carried out half the president's helicopter flights. Yet the Bush White House objected because they fell short in one key area: White Hawks don't have a tall enough door. A commander-in-chief's confident stride across the South Lawn would have to conclude in an unpresidential stoop. The White House also considered the massive tilt-rotor V-22 Osprey and CH-53 Super Stallion, both of which met the desired speed and range requirements, but eventually decided the downwash from the powerful rotors would wreak havoc on the residence's manicured gardens.

The Navy planned to unveil a new helicopter by 2007—astonishingly fast by Washington standards. For a project of such importance and pace, there were only two serious bids. Sikorsky Aircraft Corp. in Stratford, Conn., which since Eisenhower's day had manufactured every helicopter in the Marine One squadron, proposed a chopper based on its two-engine S-92 model. The second bid came from Lockheed Martin, in partnership with AgustaWestland S.p.A, an Anglo-Italian manufacturer, pushing a larger EH-101 airframe with three engines. Both bidders saw the presidential helicopter program as a way to get a leg up in another, larger contract to replace the U.S. military's aging combat search-and-rescue helicopters. There were bragging rights at stake, too. When the Pentagon awarded the Marine One job to Lockheed and AgustaWestland in 2005, the *Washington Post* observed that Sikorsky had "lost its parking spot on the White House lawn."

The Navy dubbed the new aircraft the VH-71 Kestrel. Unusually for such a prominent project with such a high patriotism factor, much of the construction was to occur overseas, at AgustaWestland's facilities in England and Italy. The Pentagon said the cost savings were worth any dent in public perception of nationalist loyalty. Militaries in those countries were already flying versions of the EH-101 that cost about $60 million each; adapting it for the president, the Pentagon estimated, would only triple the price—a bargain by executive-branch procurement standards.

That $180-million-a-pop projection would turn out to be wildly low. "My experience is that procurement programs don't get into trouble—they start out in trouble," says Charles McQueary, who helped run the Pentagon's test and evaluation programs in the Kestrel's early days. And from the outset, the Marine One reboot had a master flaw. The White House Military Office, known as Whammo to D.C. insiders, is the immensely powerful entity that administers anything the president touches that has to do with the military—whether the Navy mess or the nuclear football. When WHMO sets an operational requirement, it doesn't have to pay out of its own budget; it essentially spends other agencies' money. With the Kestrel, WHMO and the Secret Service began souping up the specs, seemingly without regard for cost.

As dreamed up, the new Marine One could fly more people farther, faster, and at a higher level of performance than any other executive helicopter on the planet. The idea was to create a true Oval Office in the sky, with videoconferencing, a galley, and a flushing toilet, as well as heavy armor and protection from nuclear, biological, and chemical weapons. Eisenhower would have approved of the climate control: The cabin had to remain between 68F and 76F, whether the outside temperature was -5 or 100. WHMO and the Secret Service insisted on a 300-mile range, which would let it fly from the White House as far as Charlotte or Albany, N.Y.

Almost from the start, critics within the Pentagon and on Capitol Hill questioned whether the Kestrel was too much helicopter—after all, the president's flights were measured in minutes, not hours. "They wanted it to have

A rendering of the next-generation Marine One helicopter

the same capability as Air Force One—that in and of itself was nearly impossible," the Pentagon's Young says. "It's hard for the public to understand how atypical this helicopter is, compared to a commercial helicopter, when you decide to put the president aboard," he adds. WHMO "believed naively that they'd buy a commercial helicopter, put some boxes inside, and fly away. That's not the way the leader of the free world flies."

Complicating the problem, WHMO was separated from the people actually building the helicopters by layers of bureaucracy: Its wish list went to the Navy, which created specs for Lockheed, which passed them along to AgustaWestland. The contractors received as many as 40 changes to the aircraft a month, and each one required rethinking the physics and engineering of the airframe. The additional weight from a certain armor, for example, required sturdier rotors. The engines had to be upgraded. The Navy insisted on reimagining and reworking much of the basic blueprints of the off-the-shelf airframe to meet not only the Federal Aviation Administration's commercial standards but also its more rigorous military ones. For instance, while the FAA required that a helicopter transmission be secured to the fuselage by four bolts—sufficient for the hundreds of other aircraft flying passengers safely around the world—the Navy insisted on six. "The issue is making up the minds of those who make the decisions upfront—and having them stick to it," McQueary says. "There was a continuing concern that the requirements continued to evolve even as construction began. That's always a danger signal."

"Now, let me tell you something. If the United States of America is under nuclear attack, the last thing on my mind will be whipping up a snack"

Even the number of helicopters fluctuated, jumping at one point from 23 to 36 and then down again. The project's original budget of $6.5 billion, set in January 2005, increased to $11.5 billion by January 2008, with the Navy under pressure to deliver the aircraft before Bush left office so he could celebrate its inaugural flight. He didn't get the chance. By the time Obama was sworn in, the program had an estimated total cost of $13 billion, or about $500 million per helicopter, and the delivery schedule had slid to 2012.

"The helicopter I have seems perfectly adequate to me," Obama said early in his presidency, at a White House Fiscal Responsibility Summit. "Of course," he joked, "I've never had a helicopter before, you know? Maybe I've been deprived, and I didn't know it." His audience laughed. Obama continued, seriously, "I think it is an example of the procurement process gone amok, and we are going to have to fix it." In May 2009 the Pentagon terminated the Marine One program. The *Post* called Obama's decision a "shot across the bow of large defense contractors." The project had plowed through $3.3 billion. With two active wars in Iraq and Afghanistan and the mortgage crisis still sending tremors through the economy, Obama found the Kestrel overruns to be a satisfying punching bag. "Among its other capabilities, it would let me cook a meal while under nuclear attack," he joked at a Veterans of Foreign Wars convention that August. "Now, let me tell you something. If the United States of America is under nuclear attack, the last thing on my mind will be whipping up a snack."

Criticizing Pentagon bloat was popular, but the fact remained that the president was flying around on equipment built when Barbra Streisand's *The Way We Were* topped the charts. And once the price of prolonging the life of the current fleet was factored in, starting a Marine One reboot from scratch was going to cost almost as much as seeing the Lockheed-AgustaWestland project through to completion. The Kestrel had been relatively far along in production. Nine fully built models existed and had undergone testing. Lockheed executives had even been taken for test rides, including James Comey, who years before he became FBI director served as the defense contractor's general counsel. Its capabilities astounded those who flew on it. "The range and speed requirements were extreme for a helicopter," Young says. But none ever landed on the White House lawn. All nine had their top-secret communications systems—known by the code name "Yankee White"—torn out. In 2011 the choppers, along with 848,720 spare parts, were sold for scrap to Canada for $164 million—recouping about 5 percent of the Kestrel expenditure.

Obama reopened the Marine One program in November 2012. This time, there was essentially only one bidder: Sikorsky. The company again proposed its S-92 airframe, which was good enough for 10 other heads of state, mostly in the Middle East and Asia. WHMO, the Secret Service, and the Pentagon cut their specs for passenger capacity, range, airspeed, hover performance, operational availability, and transportability. Also: no kitchen and no toilet. In April 2013 the U.S. Government Accountability Office praised the Navy's "rational balance between requirements, costs, and schedule." The following May, Sikorsky won an initial $1.2 billion contract to start the project. The Navy has since described the aircraft, VH-92, as an "art of the possible" helicopter, based on a model that's already in production, with communication and avionics systems that have already been tested.

In an all-but-unprecedented oversight move, the Pentagon appointed an executive steering committee, co-chaired by a Navy one-star admiral and a Marine Corps one-star general. It includes representatives from the HMX-1 squadron, the White House, and the Office of the Secretary of Defense, among others. The group has to sign off on any design or requirement change, no matter how small. "Anyone who wanted to do anything other than what was awarded would have to come talk to us. We didn't approve anything," says retired Rear Admiral CJ Jaynes, who co-chaired the committee until last year. "There was a lot of nickel-and-dime stuff: 'We prefer to have this antenna on that side of the aircraft instead of the other one'—well, no. Once we said no two or three times, people began to think hard about bringing anything forward." As for those six bolts on the transmission—the new managers have deemed that four will function just fine. (Lockheed ended up in charge of Marine One after all. It purchased Sikorsky for $9 billion in 2015.)

Two helicopters have been built and are undergoing on-the-ground testing; the first is expected to take to the air this summer. If everything stays on track, the debut presidential

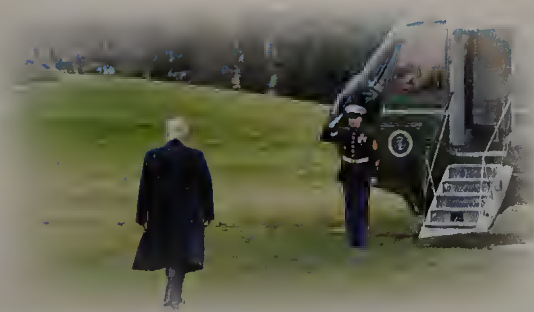
A History of Presidents Aloft

Lyndon Johnson is sworn in on Air Force One after John Kennedy's assassination

Richard Nixon leaves Washington in disgrace aboard Marine One

Gerald Ford's image never quite recovered after he tripped down the plane's stairs

Ronald Reagan aboard the 747-200s that still fly the commander-in-chief today



Donald Trump is scheduled to fly on 1974-era choppers for the next four years

flight could come as soon as 2020, with the full fleet arriving by 2023, at a total cost of about $5 billion, if not less. "The cost is coming down as we speak," says Colonel Robert Pridgen, head of the Marine One program. Still, the VH-92 is going to be a less capable helicopter than the junked Kestrel. The president "is going to get significantly less helicopter for that money," Young says. The Marine One reboot is a lesson for the new commander-in-chief: Obama's attention-grabbing effort to cut waste delivered only marginal results, at a significant delay.

The Pentagon says it hasn't yet briefed President Trump on the new helicopter fleet. "We don't have any plans on the books right now," Pridgen says. "I'm confident that they'll be pleased with the progress and design of this aircraft." He declines to speculate on what would happen if Trump demands changes to the design. "We're building this with a mind not just to the current commander-in-chief but future ones as well," Pridgen says. "It's not tailored to any one individual."

Unless Trump reopens the project, the VH-92 is largely off the drawing board. The president has a much greater ability to influence the next Air Force One, which is still in the planning phase. When the Air Force announced in January 2016 that it would work with Boeing to design the next generation of presidential plane, a 747-8, it had the Marine One cost overruns very much in mind and repeatedly emphasized the program's affordability and reasonable package of features. The company, the Pentagon, and the White House agreed to design the jets on paper first, discussing each requirement in turn and reaching a consensus before construction. The Pentagon says it intends to formally award the contract for the two planes in the next four months—a timeline that could be scrambled if Trump decides to introduce new demands, whether in terms of greater capability or lower cost. White House Deputy Chief of Staff Joe Hagin will be overseeing both the Marine One and Air Force One projects; he held the same role in George W. Bush's administration. Whether he's learned from that era's mistakes remains to be seen.

The oddity of Trump's December tweet is that the program itself is really too new to be over budget. The outlines of the project are still forming. Although most features of the plane haven't yet been decided, a few things are known: Boeing says it will be able to fly almost 1,000 nautical miles farther and produce 16 tons less carbon dioxide on a typical flight, despite being about 154,000 pounds heavier. In terms of design, Trump will presumably have final say. In his private life, Trump's personal aircraft is famously flashy—with gold-plated seat belts and bathroom faucets, a silk-lined master bedroom, a 57-inch TV, and the Trump family crest liberally emblazoned on seats and pillows. When he was given the chance to select drapes for the Oval Office, he pored over 17 options (eventually choosing gold).

Depending on the fixtures and finishing touches, the new presidential planes themselves will likely cost about $380 million apiece, all part of about $2.8 billion the Pentagon plans to spend on the Presidential Aircraft Recapitalization program by 2021. That means the U.S. will have spent more than $11 billion on new presidential aircraft in two decades—not counting the expense of maintaining the original fleet. "Both of these systems cost an absurd amount of money, but that's what we choose to do for the president of the United States to have increased safety and security," Young says. "There aren't magic lessons that's going to make it cost half as much." Ⓑ

FURY

DID UBER STEAL ... FUTURE FR

BY MAX CHAFKIN

Travis Kalanick, the chief executive officer of Uber Technologies Inc., says he needs leadership help. He recently dispatched former U.S. Attorney General Eric Holder to investigate sexual harassment claims against the company. His security team is reviewing a practice known as "Greyballing." And he's no longer going to any more meetings with President Trump.

These damage-control initiatives—in response, respectively, to a leaked video in which Kalanick was rude to an Uber driver, a blog post by a former engineer, an admission that the company had been deliberately misleading police, and a customer boycott—were the result of a month's worth of public-relations disasters. Taken alone, any of these would have been enough to slow down the famously fast-moving ride-hailing company. Taken together, they've caused some to question Uber's viability and Kalanick's staying power.

But none of these scandals has the potential financial impact of the one Uber has said the least about: a lawsuit from Alphabet Inc.—the parent of Google and Google's self-driving car division, now called Waymo—over driverless cars. Waymo says Uber is in possession of, and is basing the future of its business on, technology that was stolen by a former employee.

Self-driving technology has become a fixation for Kalanick. Developing a driverless car, he's often said, is "existential" to Uber. If a competitor managed to get there first, it could easily replicate Uber's core service (shuttling passengers) without its single largest cost (paying drivers). Over the course of a few weeks in 2015, Kalanick poached 40 researchers from the Carnegie Mellon University robotics lab, one of the country's top autonomous vehicle research centers. Then, last summer, Uber became the first company to operate a fleet of autonomous taxis, in downtown Pittsburgh. On the day it announced that service, Uber also said it had acquired Otto, a self-driving truck startup founded in January 2016 by a former Google employee, Anthony Levandowski. The 37-year-old engineer was an original member of Google's car team and a protégé of its creator, Sebastian Thrun.

At Google, Levandowski had been both a brilliant engineer and a divisive manager, with a reputation for flouting corporate norms and skirting rules to get cars on the road as quickly as possible. He was so controversial, according to several former and current employees, that when he was being considered to lead the car team, a group of engineers revolted, causing Alphabet CEO Larry Page to rethink the choice and install a different leader, Chris Urmson.

According to the legal complaint filed on behalf of Google's driverless car division—as almost everyone at Waymo still refers to it—the company began investigating Levandowski last summer after learning that Uber had paid about $700 million for his months-old company. Google's suit, filed in a San Francisco federal court, says its investigators uncovered a trove of digital evidence that hint at an unprecedented theft. According to the suit, Levandowski used his company laptop to download 14,000 design files from Google's car project. He plugged a memory card reader into the laptop and, shortly afterward, wiped all the data from the laptop. The suit also alleges that two other Otto employees took files on their way out the door.

Google seemed content to sit on that information until Dec. 13, when a Google employee received an email from a supplier that was working on components for the lidar sensor in the company's first production car. Lidar—a portmanteau of "light" and "radar"—is the key component that allows an autonomous vehicle to, essentially, see its surroundings. (It's also

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used to build maps.) Off-the-shelf sensors cost up to $80,000 and contain several individual lenses. Under Levandowski, who'd led the lidar team, Google developed a much cheaper version that used a single lens.

Strangely, though, the email's subject line—"Otto Files"—made reference to Levandowski's company. According to Google's suit, the contents of the email, which seemed to have been intended for Uber rather than Google, included a machine drawing of a lidar circuit board that had Otto's name on it but looked almost identical to Google's. Two months later, Waymo sued Uber for trade secret theft and patent infringement, seeking damages and an injunction that could seriously impede Uber's self-driving car program.

At issue is a business that both companies believe will be worth hundreds of billions or even trillions of dollars a year. And though both companies like to portray driverless cars as some near-term inevitability, this dispute shows just how messy the race to get there could prove to be.

During new-hire orientation, engineers at Google are frequently told that the company will never sue a former employee for patent infringement. The implication is twofold: first, that Google doesn't stoop to fighting over patents, though it may employ them to protect itself from people who aren't in the business of changing the world. ("These patent wars are death," Executive Chairman Eric Schmidt said at an event in 2012, calling patent litigation "bad for innovation.") And, as an extension of that, if Google sues you over a patent issue, you must have really pissed them off.

After the lawsuit was filed, Uber released a statement characterizing it as "a baseless attempt to slow down a competitor." At an all-hands meeting at the company's Pittsburgh research center, Levandowski defended Uber's lidar technology as "clean"—that is, not the product of stolen design documents—and told the company's engineers that he'd downloaded the files to work from home. Some former colleagues seem to think that even if Levandowski did what Google alleges, he doesn't deserve to be punished. "Whatever Google may say about him stealing lidar trade secrets, he was the lidar team at Google," says someone who worked at the company's driverless car program. "This is like the Swiss patent office suing Einstein for inventing the theory of relativity while he worked there."

The comparison to Einstein is obviously hyperbolic, but it also captures the foundational role Levandowski played in the development of self-driving cars. Levandowski, 6-foot-6 and relentlessly intense, is as much an entrepreneur as he is an engineer. At 16 he started a web design firm that a former colleague says made him a millionaire by the end of high school. (Levandowski didn't respond to repeated requests for comment.) As a University of California at Berkeley undergraduate, he won a national competition sponsored by Lego—he built a toy robot that could sort monopoly money.

Levandowski was 22 and working toward an MBA and an industrial engineering master's at Berkeley when he first heard about the Darpa Grand Challenge. (His mother read about it and mentioned it to him.) The 2004 competition, organized by the U.S. Department of Defense, involved a race for robotic cars on a 150-mile course in the Mojave Desert. It drew teams from Carnegie Mellon, the California Institute of Technology, a number of defense contractors, and most of the other big names in robotics. Levandowski led a ragtag team of Berkeley graduate students and research assistants.

If there was hubris in entering, there was even more in his chosen design. Ghostrider, his self-balancing,

self-driving motorcycle, was the only two-wheel vehicle in the contest. "I was assuming the driving part would be easy to solve," he said last summer, speaking to *Bloomberg Businessweek* in a joint interview with Kalanick shortly before Uber announced its acquisition of Otto. "I wanted to make something actually difficult." Although it failed to stay upright on race day—a grainy YouTube video documenting Ghostrider's run is six seconds long—the bike was still seen as an achievement by Levandowski's peers, partly because no team finished. (Ghostrider eventually became part of the Smithsonian's permanent collection.) For the next competition, in 2005, Levandowski served as the team leader for Ghostrider while also working on lidar sensors for the winning team from Stanford, which was managed by Thrun.

Levandowski and two Berkeley friends adapted the technology from Ghostrider, which had used GPS and cheap digital cameras, into a commercial product. Their company, 510 Systems LLC, sold camera systems, and eventually lidar, to mapping companies, including Nokia Corp. and Microsoft Corp. Levandowski also sold kits to automate agricultural and construction equipment.

In 2007, Google hired Thrun's team from Stanford to work on a new product, Street View, formally making Levandowski a full-time employee of the search company even as he continued to run 510. The initial plan was to supplement Google's maps, which at the time used data licensed from the mapping giant Navteq Corp., with pictures of city streets. Levandowski suggested that Thrun's mapping technology could allow Google to replace Navteq's data altogether. His mapping initiative was seen as an enormous success, allowing Google to offer on phones turn-by-turn driving directions that were as good as those offered by standalone GPS device makers.

In 2008, while doing double-duty at Google and 510, he took a call from a producer at the Discovery Channel who wanted to borrow Ghostrider for an episode of *Prototype This!*, a short-lived documentary series. Levandowski suggested instead that he use a different vehicle. He asked Google for permission to embark on the stunt using sensors similar to those on Google's mapping cars. It was granted on the condition that Levandowski, and not Google, would be responsible if something went wrong. "The lawyers said, 'Absolutely, but please don't put Google on the side,'" Levandowski told *Bloomberg Businessweek* in the interview last summer. "So we started this thing called Anthony's Robots to be very clear it wasn't Google-related." A few weeks later, under a police escort and with cameras rolling, the Pribot, as Levandowski named his converted Toyota Prius, successfully crossed the San Francisco Bay Bridge.

Google's self-driving car project began the following year with a modified Prius that used software created by Thrun at Stanford and hardware supplied by Anthony's Robots. Like 510 Systems, Anthony's Robots was operated as an independent company. The arrangement—whereby Levandowski was at once a founding member of the Google self-driving car team and a vendor who was also selling technology to other companies—was well-known to Google executives, though it was never publicly disclosed. "Anthony is a rogue force of nature," says a former Google self-driving car executive. "Each phase of his Google career he had a separate company doing exactly the same work." According to two former Google employees, founders Page and Sergey Brin tolerated Levandowski's freelancing because they saw it as the fastest way to make progress. Google's car team embraced Levandowski's nature, too. The attitude, says a former colleague, was "he's an asshole, but he's our asshole."

As Google's car project grew, a debate raged inside the company, reflecting a broader dispute about the direction of autonomous vehicles: Should the tech come gradually and be added to cars with drivers (through features like automatic parking and highway autopilot) or all at once (for instance, a fleet of fully autonomous cars operating in a city center)? Urmson, a former Carnegie Mellon professor, preferred the latter approach, arguing that incremental innovations might, paradoxically, make cars less safe. Levandowski believed otherwise and argued that Google should sell self-driving kits that could be retrofitted on cars, former colleagues say.

Urmson won out, and according to two former employees, Levandowski sulked openly. After one dispute between the two, Levandowski stopped coming to work for months, devoting his time to his side projects. This didn't stop Page and Brin from discreetly acquiring 510 Systems and Anthony's Robots for roughly $50 million in 2011.

As Google's driverless car program matured, Levandowski seemed to become impatient. Creating a fully functioning driverless car means training a complicated hardware and software system to identify lane lines and red lights and to control the car's movements. It also means writing software that anticipates thousands of unlikely "edge cases"—hairpin turns, drivers who use hand signals, covered bridges, recumbent bikes, and so on. That work seemed to bore Levandowski. He became increasingly frustrated at Google's inability to operate its cars on city streets and decided to take matters into his own hands. "Engineers were like, 'We are totally ready to go,' and I'm like, 'Let's go then. Let's see whether it's real or a demo,'" Levandowski said in the summer interview.

Without formally telling Google, which considered its cars not yet ready for open-road tests, he hired a lobbyist in Nevada and wrote a law that allowed companies to test autonomous cars with so-called safety drivers. (Self-driving car companies use the term to describe an engineer who sits in the driver's seat with her hands on the wheel in case the car malfunctions.) The law passed at the end of 2011, though Google hasn't conducted large-scale tests in the state. Google's government relations department learned about Levandowski's Nevada efforts when the lobbyist, David Goldwater, sent the company an invoice.

Levandowski first met Kalanick in 2011 at a TED conference, but the two didn't become close until early 2016, after Levandowski pitched Kalanick on an investment in Otto. Kalanick didn't invest—but he did begin meeting with Levandowski in secret. In the interview with *Bloomberg Businessweek* at the time of the acquisition, Kalanick described these rendezvous in detail: The two would go to the San Francisco Ferry Building after sunset, entering separately and each picking up takeout food. They'd begin walking west toward the Golden Gate Bridge, where they'd eventually join up and begin talking. Kalanick recalled that he and Levandowski went on five or so of these walks, each one lasting several hours.

Kalanick, now 40, was taken by the younger man's hustle and sense of purpose, describing him as a "brother from another mother." To get self-driving cars to production, Kalanick said in the interview, "it can't just be about science. It has to be about engineering and entrepreneurialism that takes us into the real world. That's where Anthony and I connect, right?"

Levandowski, who was sitting next to him, nodded. "We think very similarly in terms of how do we get things out onto the world fastest," he said. "How do we make a difference, how do we make impact, how do we get people using our technology." Levandowski hinted that he'd decided to break with Google and start Otto in part out of frustration at the slow pace of innovation at Google.

That might not have been the whole story. On March 10, Google, which is seeking a preliminary injunction to stop Uber from using its technology, filed written testimony from Pierre-Yves Droz, Levandowski's co-founder at 510 Systems and the technical lead on Google's lidar program. Droz wrote that in

the summer of 2015 Levandowski said Uber might be interested in "buying the team" and that in January 2016 he told Droz he would "replicate" the company's lidar. When Levandowski quit to start Otto, he was escorted out by Google security. A handful of Google employees soon followed him to the new company.

Soon after, Levandowski began making trips to Uber's self-driving car research center in Pittsburgh, where a staff that had grown to 500 was scrambling to launch the pilot taxi service. Levandowski wasn't widely introduced; senior managers believed he was a consultant. "As far as the team knew," says a former employee, Levandowski was "some guy who would come around and be annoying."

At Otto's San Francisco headquarters, the startup, which had 90 or so employees, prepared for its product launch in May. Down a stretch of Nevada highway, the company ran a self-driving big-rig truck kitted out with sensors and computer controllers. Documents uncovered by the tech publication *Backchannel* showed that Levandowksi had sought the approval of state regulators to film the demo. When they denied his request to do the run, he went through with it anyway. (Goldwater, again serving as Levandowski's lobbyist, argued in an email to the Nevada Department of Motor Vehicles that it had no jurisdiction in the matter. A senior DMV administrator called the test "illegal" in an internal email but declined to rebuke Otto publicly.)

In August, Uber acquired Otto for roughly $700 million in company stock. The plan, Kalanick said, was to continue building Otto's trucking business and to use the startup's homegrown lidar to beef up Uber's own self-driving cars, all under Levandowski's supervision. Uber's Pittsburgh team learned of the acquisition, and the fact that they had a new boss, the day it was announced. "The team was super unhappy," says a former employee. It turned out that Otto's lidar was a work in progress—the company's prototype trucks were still using sensors manufactured by Velodyne Lidar Inc. "We thought we were getting some supersecret sauce by joining them," says the employee. "But they did smoke and mirrors and got a huge acquisition offer." Over the next six months, about 15 of the original 40 Carnegie Mellon engineers left. At least three have subsequently founded competing self-driving car companies, one of which recently received a $1 billion investment over five years from Ford Motor Co.

Levandowski seemed to struggle in other ways as well. In December, Uber dispatched 16 self-driving cars, with safety drivers, in San Francisco without seeking a permit from the California DMV. The test went poorly—on the first day, a self-driving car ran a red light, and the DMV ordered Uber to halt its program in the state. The company suffered further embarrassment when a *New York Times* article, citing leaked documents, suggested that Uber's explanation for the traffic violation—that it had been caused by human error—wasn't complete. The car malfunctioned, and the driver failed to stop it.

The misdirection came as no surprise to the Uber employees who'd spent time at Otto's San Francisco headquarters. Someone there had distributed stickers—in OSHA orange—with a tongue-in-cheek slogan: "Safety third."

Uber has yet to file a legal response to Google's complaint—a spokeswoman says it plans to do so later this month—but the company essentially has two options: It can settle with Waymo and license its sensors, or it can fight. "What Waymo probably wants is to license its patents to Uber," says Robert Gomulkiewicz, a former Microsoft intellectual-property lawyer who's now a professor at the University of Washington School of Law. "In this kind of litigation, that's the typical sequence of events."

That said, this isn't a typical patent dispute, and Uber isn't a typical company. If it fights, it could argue, as Levandowski did at the all-hands meeting in Pittsburgh, that the alleged document dump was simply part of an effort on his part to work from home. It could also cite how Google seemed to encourage Levandowski's freelance excursions. And while many of his former colleagues assume that Google wouldn't sue Levandowski if the forensic evidence wasn't incontrovertible—that is, if it didn't have him dead to rights—other former colleagues and some industry insiders see the lawsuit as evidence that Google is struggling to make up for its failure to bring a product to market quickly.

Levandowski. At Otto, a running joke was "Safety third."

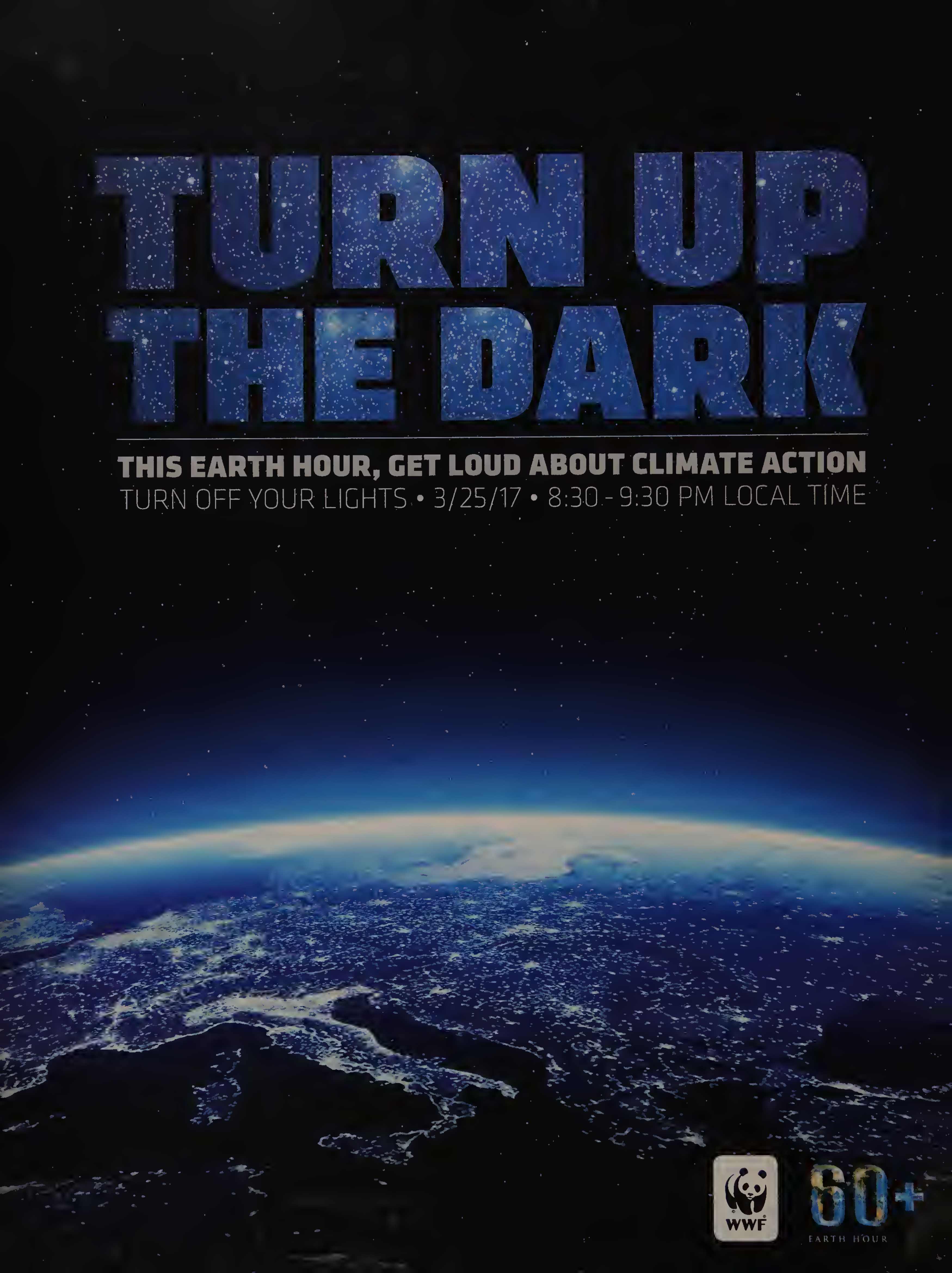
"Google is the Xerox Parc of self-driving cars," says George Hotz, the founder of Comma.ai, another autonomous car startup. It's a backhanded compliment: Although Xerox's Palo Alto Research Center invented the modern computer operating system, it didn't bring the invention to market; Apple Inc. did. "The real question is, why hasn't Google shipped?" Hotz asks. He regards Google's lawsuit as a deliberate conflation of two different beefs. The first—the accusation that Levandowski stole documents—is serious. The second, Hotz says, "just signals weakness on Google's part." In Silicon Valley, and at the Googleplex, litigation is looked upon as the last refuge of the undisruptive.

Whatever Levandowski did with Google's files, he's not wrong that Google has struggled to commercialize technology that's widely regarded as the best in the automotive industry. Before Google worked on its current prototype, a two-seater that has a top speed of 20 miles per hour and vaguely resembles a koala bear, the company pitched Elon Musk on outfitting his electric Tesla vehicles with Google tech, according to two people familiar with the deal. Musk passed and a few years later launched Tesla Inc.'s highway autopilot service on his own. A former Google executive says John Krafcik, who joined the car project as CEO in 2015, would sometimes appear rattled by the competitive moves of Tesla and Uber, wondering aloud if Google may have already been "leapfrogged." He would grow particularly irritable "every time Elon would post something on Twitter," the executive says.

Levandowski hasn't shown any sign of being rattled or contrite. Three days after the lawsuit hit, he appeared onstage in Barcelona as a marquee speaker at the Mobile World Congress.

The lawsuit never came up. As a final question, the moderator, the chief marketing officer of a cell phone industry trade group, simply asked, "Do you drive?" Levandowski smiled. "Sometimes I drive, and sometimes I'm driven," he said. "That's the beauty of being able to work on this project—you get to see the technology evolve and get better over time."

"Absolutely fascinating stuff," the moderator replied. "Please, everyone: a round of applause for Anthony." The crowd, stacked with top executives from the world's biggest companies, complied enthusiastically. Ⓑ —*With Dana Hull and Ashlee Vance*


TURN UP THE DARK
THIS EARTH HOUR, GET LOUD ABOUT CLIMATE ACTION
TURN OFF YOUR LIGHTS • 3/25/17 • 8:30 - 9:30 PM LOCAL TIME
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EARTH HOUR

UTOPIA ON THE HIGH SEAS / FEELIN' IT AT EMO NIGHT / WORK WHEREVER YOU WANT / WINE COOLERS WITH CLASS

ETC

IN 15 MINUTES, FANATICS CAN SLAP THE THRILL OF VICTORY ON A T-SHIRT

BY EBEN NOVY-WILLIAMS

At 6:03 p.m. on Sunday, March 12, Northwestern University's men's basketball team officially earned its first NCAA Tournament berth in the school's history. At 6:07, Fanatics Inc., the world's largest sports apparel retailer, posted its newest product, a purple Northwestern T-shirt that reads "Chicago Is Dancin': The Road to the Final Four."

That's the speed at which licensed sports merchandise moves now: minutes and seconds, not hours and days. If you've gone online to buy a shirt, hat, or jersey for your favorite team, you've likely bought it from Fanatics—whether you knew it or not. In the past five years, Fanatics has crept into every facet of the sports apparel industry. "This is the biggest change to a single marketplace that we've seen in a decade or two," says Marty Brochstein, a senior vice president at the International Licensing Industry Merchandisers' Association.

That Northwestern shirt was an easy layup for the Fanatics team—the Wildcats were almost guaranteed a berth in this year's tournament, and the design was approved on March 7—but what happens when Nowhere U. beats Duke University in the opening round? Those are the moments Fanatics really lives for.

The company has roughly a dozen rapid responders camped in its Jacksonville, Fla., and San Mateo, Calif., offices during tournament games. "That's my Ferrari team," says Raphael Peck, president of Fanatics' branded apparel division. "They only go fast." The war rooms look like man caves that have just hosted all-night hackathons: laptops litter tables, while pinboards lining the walls are full of layouts, notes, and templates. At one end of each room are a few flatscreen TVs, which on a normal day are used mostly for videoconferencing. During a major sports event, however, each will be tuned to a game and monitored intently. When the clock expires, it's go time.

As an official NCAA partner, Fanatics has design books for each college that list approved logos, colors, and typefaces. Using those raw ingredients, it takes the rapid responders all of a few minutes to whip up a T-shirt reflecting the storyline, whether it's a come-from-behind victory by an acclaimed powerhouse or a moment in the sun for an also-ran. From there, the design goes to the school's licensing or athletic department for approval. Once that's received—which can be almost immediately, if Fanatics has a long-standing relationship with the program, or take agonizing minutes with a school caught unawares—the shirt is listed on the Fanatics website. The whole process can take less than 15 minutes from final shot to first sale.

Peck is the architect of this part of Fanatics' business; prior to his arrival, the company was almost entirely a retail outlet for other manufacturers' merchandise. The shift occurred under the leadership of billionaire Michael Rubin, who bought Fanatics in 2011 and merged it with his e-commerce technology company, GSI Inc., which, among other things, handled online sales for the major U.S. sports leagues. Rubin sold GSI to EBay Inc. later that year but hung onto his league relationships, which he transferred to Fanatics, and then used proceeds from the sale to acquire Plantation, Fla.-based sports retailer Dreams Inc. The combined enterprise quickly grew into a merchandise juggernaut, with products ranging from apparel and jerseys to branded bobbleheads, lawn chairs, mugs, and grills.

Fanatics won't discuss financials, but it was valued at $3.1 billion when it raised capital in 2015.

Peck joined Fanatics in 2013 from Oakley Inc., where he'd been in charge of its global apparel and footwear business. Spend a few minutes talking to him, and it's clear he loves speed: "Ferrari team" is a term of endearment; he sometimes calls them the Lamborghini team or the Porsche team, depending on how he's feeling.

To fully show off its flexibility and speed, Fanatics needs narratives, and the three-week, 68-team NCAA basketball tournament is the autobahn of sporting events. It occurs at an otherwise slow time on the sports calendar, between the end of the NFL season and the beginning of the NBA playoffs, and it's invariably full of unpredictable (i.e., highly marketable) moments.

Just ask the folks at Georgia State University. In 2015 the No. 14-seed Panthers pulled off a memorable upset, posting a 57-56 win over No. 3-seed Baylor University in the first round. The game-winning three-pointer was made by the coach's son. Dad, who had torn his Achilles tendon celebrating their tournament berth, fell off his seat in shock as the shot sunk into the net.

The win stunned Georgia State's athletic department almost as much as it did the rest of the country. Until that moment, merchandise was an afterthought and, in retrospect, a missed opportunity. Brian Kelly, who oversees the Panthers' external affairs, calls it "the Baylor whiff." "Don't get me wrong, we made a lot of money, and it had an impact, but we could have had something much better if we were more prepared," Kelly says. "It was an important


The “Ferrari team” printing T-shirts during the 2016 tourney

lesson.” Fanatics helped compensate for some of that unpreparedness. Within 15 minutes, a shirt with the David-vs.-Goliath-esque slogan “This Was No Upset,” spelled out in Georgia State’s approved fonts and colors, had been approved and posted for sale on the Fanatics website.

Psychologically, that 15 minutes is critical. In today’s on-demand society, fleeting attention spans require instantaneous satisfaction. A student’s, parent’s, or alum’s passion peaks right at the end of a big game. “To fully monetize that opportunity, you want to be up and running as close as possible to that highest level of passion,” Peck says. “Speed is absolutely critical. As quick as that passion grows is as quick as it dissipates.” Fanatics’ licensing deals differ by school, but in general, colleges get 10 percent to 18 percent of the $20 to $30 retail price.

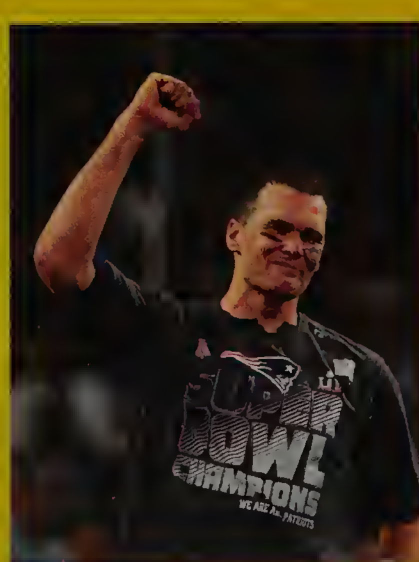
Not that long ago, the supply chain for sports gear took days. For events such as the Super Bowl, a lot of material had to be printed in advance, creating upfront risk for manufacturers and a lot of wasted product. Items surrounding less-predictable events were much harder to manage: Set the whole design, approval, print, package, and shipping process in motion, and the moment had likely passed by the time the product was available. That was most true in the NCAA Tournament, where a team can go from Cinderella to eliminated in 48 hours. (Again, see Georgia State, which lost in the second round to sixth-seeded Xavier University, 75-67.) Fanatics’ U.S.-based manufacturing process is nimble enough to keep up. If only 10 people want a shirt to commemorate that crazy upset, Fanatics will sell, and print, only 10.

Lately, the company has begun to expand and diversify its operations. It runs the online shops for MLB, Nascar, the NBA, NFL, and NHL, as well as for dozens of individual franchises and university athletic departments. Fanatics also runs the NBA’s flagship store in New York and has a rapidly growing memorabilia offshoot, signing stars including Stephen Curry, Ronda Rousey, and Peyton Manning for exclusive rights to their autographs and collectibles. Most important, under Peck’s guidance, Fanatics has begun taking on the exclusive rights to manufacture licensed gear, which allows the company to put its own brand on its goods (instead of, say, Nike’s), and hence in the public eye. When the New England Patriots won the Super Bowl this year, quarterback Tom Brady and his teammates celebrated in the locker room with Fanatics-branded shirts. Starting next season, the company will make all the replica jerseys for the NHL, plus on-ice Stanley Cup merchandise.

Of course, Fanatics is far from the only one in this space. Major sporting goods companies such as Nike, Adidas, and Under Armour remain major licensees, and retailers such as Wal-Mart, Target, and Dick’s Sporting Goods sell a lot of sports apparel. But no company is combining those two functions like Fanatics, let alone matching its speed.

To stay ahead, Fanatics is doubling down on manufacturing. It’s investing more than $100 million in technology and production, including a new platform for all its sites; apparel personalization capabilities; and communication between its main warehouses in Jacksonville and Frazeysburg, Ohio, and the one being built in Las Vegas. Also new this year is a special printing process, somewhere between slower, one-off digital printing and faster bulk screen printing. The middle ground will allow the company to meet production requirements for items with more than niche but less than wide interest. (Fanatics uses its own algorithms to determine likely demand.) It tested the system during the Super Bowl and World Series and will implement it fully during the NCAA Tournament.

Tom Brady wearing a Fanatics-branded T-shirt after the Patriots’ latest Super Bowl win



There’s at least one area where Fanatics is deliberately slowing itself down. For major championships such as the Super Bowl, when there are two possible winners and lots of possible designs for each team that can be prepared ahead of time, the company doesn’t list all its products at once; it rolls them out in waves. The aim is to give fans a reason to check back and buy something new. Less than a minute after explaining that, though, Peck gets back on message. “We want to be at internet speed,” he says. “You can never be too fast.” Ⓑ

A Cooler Wine Cooler

Not even Bartles & Jaymes could escape the handcrafted craze. Here are three old favorites, reinvented. By Adam Erace

WINE COOLER

The Classic: Bartles & Jaymes

The Upgrade: Ramona wine coolers, $19.99 for a four-pack of 250-milliliter cans; franklywines.com

"For a lot of people in their 30s, wine coolers have legit emotional resonance," says Jordan Salcito, beverage director at the Momofuku Group and Ramona's creator. "That was the first time I thought, Oh, this alcohol thing is pretty tasty." Made from organic zibibbo grapes (a Sicilian strain of muscat), natural grapefruit flavor, and cane sugar, Ramona's first creation has the fizzy, subdued sweetness to complement a cookout.

Also try: Garden Party Botanical hard sodas, whose whimsical floral messaging (debut flavors are violet and ruby) belies a serious punch: Their 8 percent alcohol by volume is about the same as an imperial India pale ale ($9.99 for a four-pack of 12-ounce cans; Target and Whole Foods locations in Indiana).

MALT LIQUOR

The Classic: Colt 45

The Upgrade: Amber Waves, $10 for a 22-oz. bottle, available in limited release at Charleston, S.C.'s Revelry Brewing Co.

While malt liquor may be lowbrow (it must contain 50 percent "adjunct," any additive other than barley), this one has an impressive pedigree, as it's made with Geechie Boy Mill Jimmy Red dent corn and Anson Mills Carolina gold rice. The result is a slightly sweet, thoroughly local take on the style. "We like to poke fun at ourselves, and it's fun to have discerning drinkers drinking malt liquor made by a craft brewer and a two-time James Beard Award-winning chef," says brewmaster Ryan Coker, who created Amber Waves with Sean Brock, the renowned restaurateur behind Charleston's Husk.

Also try: Minhas Craft Brewery's Axehead malt liquor has a mellow hoppiness—and 11 percent ABV ($2.29 for a 16-oz. can; Woodman's Markets in Wisconsin).

HARD LEMONADE

The Classic: Zima

The Upgrade: Quaker City Malting Co. lemon shrub, $10.99 for a six-pack of 12-oz. cans at Philadelphia-area Whole Foods stores

A shrub is a Colonial-era beverage made by blending fruit syrup with vinegar, which Quaker City mixes with beer to create its tart, toasty hard soda. "I'm a history nerd," says Quaker City founder Steven Grasse, the man behind Sailor Jerry and Hendrick's. "My idea was to take recipes from America's historical past and then art direct them in an industrial style." Grasse started small last fall, testing lemon shrub and its sibling, Old Dutch, a hard root beer variant, in the Philly and Denver markets. Thanks to a partnership with Diageo Plc, distribution will expand this year.

Also try: Austin's Mighty Swell, which makes its sparkling lemonade with fruit juice and eschews high-fructose corn syrup ($8-$10 for a four-pack of 12-oz. cans; Whole Foods and H-E-B stores in select states).

HAVE LAPTOP WILL TRAVEL

Remote-work programs help you see the world—but not actually live in it. By Linda Kinstler

One recent evening, real estate executive Micki McNie stayed late at the office to close a deal with a new client looking to buy a home. Business was booming at the Denver-area company she runs, 33 Zen Lane, but she still couldn't afford to push the contract to the morning—that would ruin the tour planned for Cambodia's Angkor Wat.

McNie has spent the past six months coordinating the team of brokers at her extremely brick-and-mortar business from abroad—first from the island of Jeju in South Korea, then from Chiang Mai, Thailand—courtesy of Hacker Paradise, a "traveling community for creative types." Some unfortunately timed phone calls aside, it's been healthy for her three-year-old company. Going abroad "was a choice to step into a more managerial role, or to walk away," says McNie, who sought out Hacker Paradise on the advice of a business coach. These days, she's closing deals from Jávea, across from Ibiza on the coast of Spain.

Should you desire a similar experience, it'll cost you. A handful of companies will set you up with shared workspaces in far-flung locales for about $2,000 a month, which may or may not include living quarters. Trips last anywhere from a few weeks to the rest of your life. The patriarch of the roving office clan is two-year-old Remote Year, whose co-founder, Greg Caplan, attributes its sudden popularity to the ballooning of the "odyssey years" between college graduation and settling down. "That period of time used to be about three to six months, but now it can be 10 to 15 years," he says.

If hordes of wanderlusty young workers are one key component, then the broadening of broadband access is another. "Over the past five years, the soaring infrastructure around the world has made remote work more common and more feasible," says Hacker Paradise founder Casey Rosengren. While many companies limit their nomads to wired cities such as Prague, Hong Kong, Tokyo, and Madrid, part of the allure to travelers lies in going farther afield. WiFi Tribe Co. co-founder Bejarano Gerke says he warns clients headed to less reliable locales: "It won't be perfect, it won't be like at home, but we're setting up fail-safe systems"—i.e., mobile 4G hotspots—"so your work doesn't need to be affected."

One irony of the remote-work concept is that constant connectivity winds up throwing barriers between you and the places you've traveled so far to inhabit. Some remote workers have to be online at the same time as colleagues in San Francisco, Austin, and New York, meaning they're often working and sleeping when locals are socializing and going about their days. Sleep deprivation makes it that much harder to adjust to a new culture. "Amid the onslaught of scooters, stray dogs, and seemingly orderless traffic in Southeast Asia, small tasks like buying contact solution had become near-Olympian feats," said Mashable writer Stephanie Walden in a post about her experience as a part of Remote Year's first beta-testing cohort.

Others are unfazed, saying they increased their productivity and enriched their professional lives. "I feel like I talk to my team more now that I'm away," says Thomas Dempsey, 26, who's traveling in Brazil with We Roam while serving as chief operating officer of a New Orleans venture capital firm. Since he deals mostly with out-of-state clients, moving abroad "wasn't too hard of a sell to my bosses," he says.

Most programs focus on recruiting groups of "like-minded young professionals," which isn't great for expanding your horizons but does lead to some excellent networking. "People ended up hiring each other, people ended up dating each other," Rosengren says of his company's early trips. While it was initially open only to engineers and programmers, Hacker Paradise has since become more tolerant. "If you're an accountant, you can't come," he says. "But if you're an accountant and you want to work on the next great novel, absolutely." Ⓑ

ALL THE FEELS

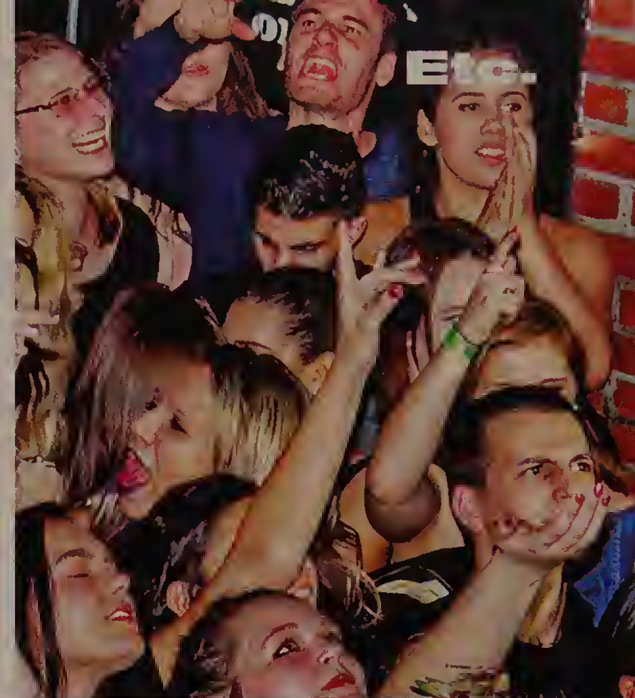
At Emo Night BK, partiers of a certain age revisit the tunes of their youth. By Ariana Igneri

One evening in January, just before midnight, more than 300 people—most in old band T-shirts and ripped, black jeans—stood in line outside a bar in Manhattan's SoHo neighborhood. Empty Bud Light cans littered the sidewalk, and *The Anthem* by Good Charlotte thumped softly from speakers inside. "What's everyone waiting for?" a passerby asked. "*Hamilton!*" a girl with purple lipstick shouted back, snickering. She moved ahead in line and swept her bangs under her hat, which read, in big, bold letters, "Make Emo Great Again."

They were actually waiting to get into Emo Night BK, a semiregular series of DJ nights. It's held mostly in Brooklyn but occasionally goes on tour to cities such as Denver, Detroit, and Las Vegas. Emo—short for "emotive hardcore music"—is a loosely defined subgenre of rock characterized by pop-punk hooks and sentimentally fraught lyrics. In other words, it's hardly the soundtrack of a Trump rally. "This is for everyone who wants to relive their high school years"—specifically the late '90s and early 2000s, emo's peak—"when they didn't have a care in the world," says Ethan Maccoby, 26, one of Emo Night BK's founders. He and Alex Badanes, 27, who host the parties, started throwing them while undergraduates at Tufts University and Berklee College of Music, respectively. Their original goal was simply to chill with friends and listen to great music, but since they graduated and moved to New York, the shindig has evolved into the largest emo night on the East Coast, with as many as a dozen parties a month.

Emo Night BK routinely sells out midsize concert spaces, including New York's Irving Plaza and Brooklyn Bowl, whose talent buyer, Lucas Sacks, was one of the first to approach Maccoby and Badanes for a major venue. Sacks learned about Emo Night BK from a friend who attended one of the early events in 2015, at a small basement bar in Brooklyn's Williamsburg neighborhood. "They had to turn people away within 30 minutes," he says. "As soon as I heard that, my promoter brain kicked in."

Other cities have their own, unrelated events; there's Emo Night Nashville and Emo Nite LA, which celebrated its two-year anniversary in December with a birthday bash that featured 20 guest acts, including the All-American Rejects and an emo-playing marching band. A livestream of the event reached 100,000 people. Last year, Emo Nite LA spun off Emo Nite



Bawltimore, its first regional offshoot.

Tickets to most emo nights are just $10, allowing fans to reexperience old bands, songs, and youthful emotions for cheap. "People like the nostalgia appeal," says Andrew Mumm, a talent buyer at the Bell House in Brooklyn, which often hosts the Sons & Heirs, a popular tribute band to '80s alt rockers the Smiths, considered emo predecessors by some. "We get a lot of 25- to 40-year-olds coming out," he says. "These shows give them a shared interest and a way to express themselves."

Maccoby and Badanes always DJ the opening set of Emo Night BK, but they also frequently invite emo celebrities like Yellowcard frontman Ryan Key to

man the tables and draw the crowds. "We don't want to admit we're getting older, but we are," says Key, 37. After two decades, Yellowcard is playing its last concert on March 25. "I don't know if I'll be looking for a record deal or touring again," he says, "but this has been a way to connect with fans like I never have before."

At Emo Night BK, the partygoers typically stay late—usually past 4 a.m.—and return often, according to Maccoby, who's started to recognize familiar faces. Friends Emanuel Natera, a construction project coordinator, and Tess Smith, a hairstylist, both 31, met at an Emo Night BK and have missed only a few shows since 2015. "You meet people from all walks of life," Natera says, "from fresh undergrads all the way down to couples with kids." For Smith, the events are a way to revisit her youthful freedom. "Sometimes I meet people my own age with kids," she says. "I could be a mom, but at emo night, I get to listen to music and drink beer instead. That's the dream." ●

Ethan Maccoby and Alex Badanes at Emo Night BK

AHOY, CITIZENS!

In a new book, the Seasteading Institute attempts to plant its flag in the high seas. By Laurence Lowe

In 2008, PayPal co-founder Peter Thiel gave half a million dollars to a Google engineer named Patri Friedman, the grandson of economist Milton Friedman. The money was to establish the Seasteading Institute, which aims to spearhead the development of politically autonomous, floating "seasteads" in unregulated international waters. This was to be the beginning of a long experiment in civilization building. It also turned out to be the origin of many, many puns.

Nearly a decade in, this experiment has yielded more theory than practice. Nevertheless, the institute has published a wildly optimistic book called *Seasteading: How Floating Nations Will Restore the Environment, Enrich the Poor, Cure the Sick, and Liberate Humanity From Politicians*. Written by staff "aquapreneur" Joe Quirk, with an assist from Friedman, *Seasteading*'s principal argument is that "the world needs a Silicon Valley of the sea, where those who wish to experiment with building new societies can go to demonstrate their ideas in practice."

The dream of oceanic colonization is at least as old as science fiction, but the institute is both contemporary and sincere. The book begins by heralding 2050 as a "deadly deadline: an approaching pinch point in the supply of several key commodities that humanity needs to survive." By then, Quirk and Friedman warn, more than half the world's population will lack fresh water, and we'll have reached "peak phosphorous," when we no longer have enough of the mineral, which is key to agricultural production, to feed ourselves.

For every problem the book raises, seasteading is the solution. "Imagine"—lots of sentences begin with that word—"if we didn't have to wait for the caprice of political history to create Hong Kongs and Singapores." (Hong Kong counts as a "pre-stead.") While critics envision seasteads as glorified tax havens for the rich, proponents contend that mobile, modular colonies represent humanity's last best hope—be it for testing new modes of governance or combating the rising tide of climate change.

Seasteading goes to great lengths to convince us that free-floating cities aren't as far-fetched as they sound, and in some respects, it succeeds. What are cruise ships, Quirk and Friedman ask, if not prototypical seasteads? They tout the browniness of a liquefied natural gas platform built by Shell to withstand a Category 5 typhoon. They salivate over the idea of a carbon-neutral skyscraper made of magnesium harvested from seawater (aka "seament" or "seacrete"). But if you're expecting *Seasteading* to pay more than scant attention to, say, the cruise industry's checkered record on workers' rights, it will disappoint you. Quirk and Friedman's techno-libertarian self-certainty runs deep.

Along the way, the writers regale us with "bluetopian" proposals from marine biologists, nautical engineers, a feminist "shesteader," and *Titanic* co-discoverer Robert Ballard, who recounts the time he went *mano a mano* with Buzz Aldrin over space vs. sea colonization during a National Geographic TV special. ("I really took off the gloves and told the astronauts that populating Mars was a crock of shit.")

Every summer, the institute hosts a BYOB (Bring Your Own Boat) floating festival on the Sacramento Delta called Ephemerisle, during which several hundred "seatizens" self-organize and self-govern, much like an aquatic version of Burning Man. In January the institute received permission from the government of French Polynesia to pilot an autonomous Floating Island Project off its shore—building in deep international waters has thus far proved too logistically complicated—the first step toward creating a permanent colony.

Meanwhile, this year's Ephemerisle is set for July. A reality-TV production company once expressed interest in doing a series on the gathering, but Quirk and Friedman proudly report there just wasn't enough conflict to make it work. This, of course, proves their point. "If you want people to fight," they write, "condemn them to a crowded space where they can't take their land and go elsewhere." B

TALI EDUT

42, co-founder and co-owner, AstroTwins, Seattle

What do you do for work?
My twin sister and I own an astrology-themed lifestyle brand. We write daily horoscopes for our website, and we've published a few books, too.

How did you land on that career path?
It was an accident! My sister and I published our own women's magazine in college, and we talked about astrology a lot. One of our colleagues later worked at *Teen People*, and they needed an astrologer. We landed the column, and that was that.

Is there a story behind your necklace?
It's a divination tool. You ask it a yes/no question and swing it, and depending on how it swings, that's your answer.

It looks like one of your bracelets has writing on it.
It says "abracadabra," which I thought was kind of cheeky and fun. You need a sense of humor to do this.

How would you describe your style?
Pretty cosmic. I'm a Sagittarius, so I like to be a little different.

Like your jumpsuit.
Yes. It's got Seventies bell-bottoms and is supercomfortable. I can just sit and write or put on a heel and go out at night.

Is that an elephant back there?
That's a little sculpture my friend got for me when she went to India. Elephants represent wisdom and abundance, so it's nice to remember that while I write.

Do you always wear it with those clogs?
Not always, but I love them.

interview by Jason Chen

How Did I Get Here?

GLENN KELMAN

Chief executive officer, Redfin

A site for online real estate listings designed to make homebuying easier

With his twin brother, Wesley (right), and their mother, Linda, 1989

Education

Interlake High School, Bellevue, Wash., class of 1989

University of California at Berkeley, class of 1993

“Everyone thought I would go to medical school. I got into Columbia and didn’t end up going.”

“I played soccer and was chess team captain. I was determined not to go into business. I just thought it was the definition of evil.”

Work Experience

1993–94
Unpublished novelist

“You’re alone in a room all day, your girlfriend gets really tired of your novel, and then you’re broke and you hate yourself.”

1995–97
Product manager, Stanford Technology Group Inc.

“We were just a handful of people, so I did product, marketing, sales, and worked with engineering. It was entrepreneur boot camp.”

1997–2004
Co-founder, vice president for product and marketing, Plumtree Software Inc.

With Wesley (right) at Denali National Park and Preserve, 2004

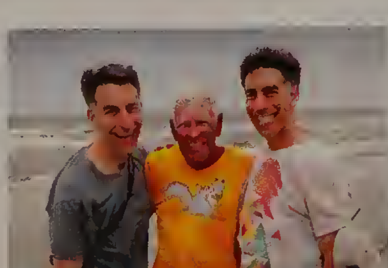
“We created the first portal software for businesses to see documents and data from dozens of different systems. I worked 90-hour weeks in every job except sales. We went public in 2002.”

With Visa executive Chris Hughes (center) and Atlassian President Jay Simons after completing a Seattle-to-Portland bike ride, 2004

2005–Present
CEO, Redfin Corp.

“I reapplied to medical school in 2005 and deferred to 2007. I’d been taking care of an ill family member and felt it was a higher calling. But medicine is not creative at all. It’s formulaic and prescriptive—I just couldn’t.”

“We launched Redfin Mortgage in January for lending money to our homebuying customers. The long-term goal is to make the whole process so fast that our borrowers can compete with cash buyers.”



With Wesley (right) and their father, Lloyd, in Hilton Head, S.C., 2015

Life Lessons

1. “A human being’s most important trait is the quality of his or her energy.” **2.** “Even if it’s a good idea in the abstract, it might not be what you’re born to do.” **3.** “A business has to have a mission beyond making money. It has to do good.”

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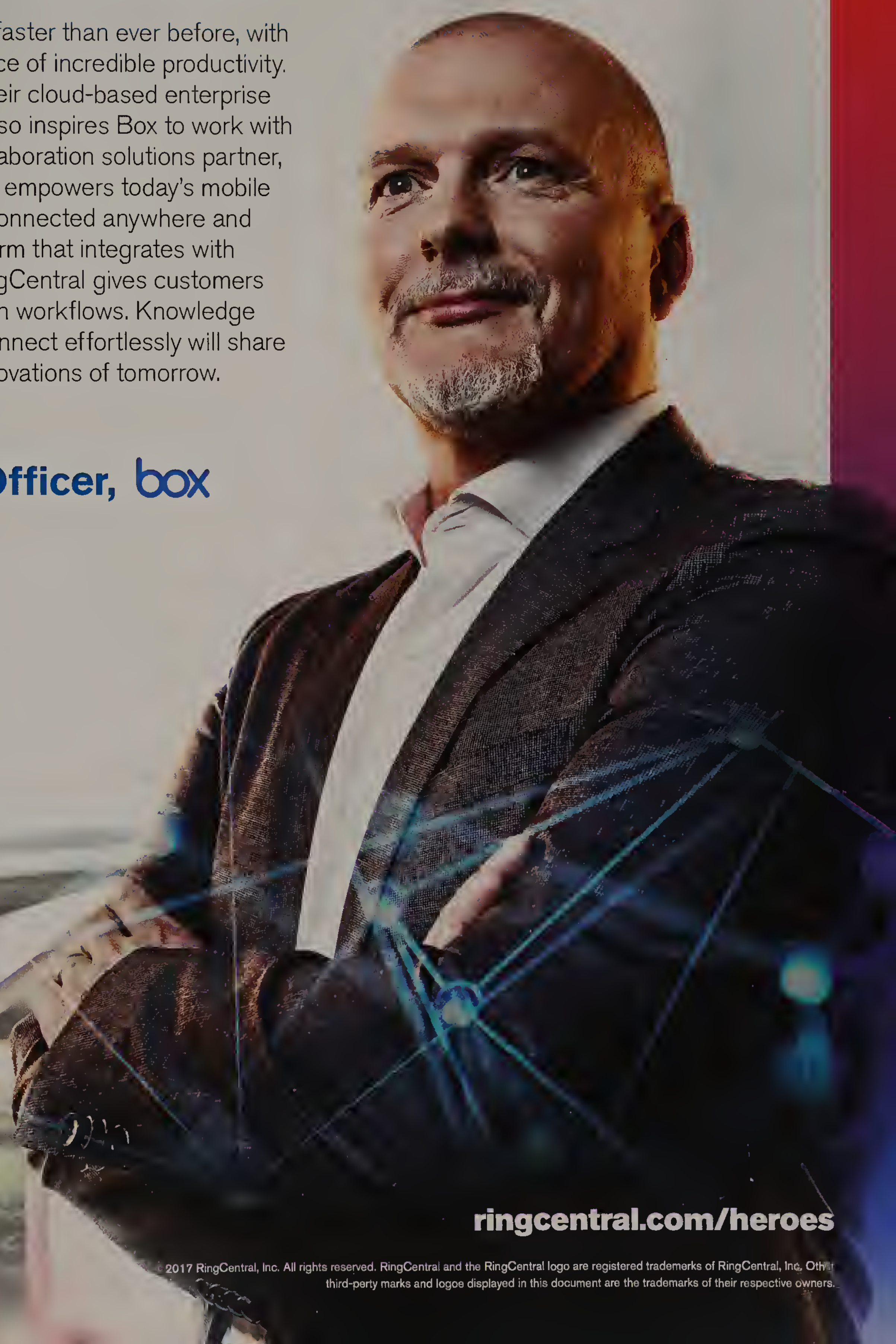
Box knows workflows are moving faster than ever before, with professionals collaborating at a pace of incredible productivity. This realization not only inspires their cloud-based enterprise content management solution, it also inspires Box to work with a trusted communications and collaboration solutions partner, also born in the cloud. RingCentral empowers today's mobile and distributed workforces to be connected anywhere and on any device. With an open platform that integrates with today's leading business apps, RingCentral gives customers the flexibility to customize their own workflows. Knowledge is power, and organizations that connect effortlessly will share the brilliant ideas that build the innovations of tomorrow.

PAUL CHAPMAN
Chief Information Officer, box



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